



PATENTS ACT 1977

APPLICANT Jaguar Land Rover Limited

ISSUE Whether patent application GB 1718717.0 complies
with sections 1(1)(b) and 1(2)(c)

HEARING OFFICER Dr CL Davies

DECISION

Introduction

- 1 Patent application GB1718717.0 ("the application") entitled "Determining a minimum state of charge for an energy storage means of a vehicle" was filed on 13 November 2017 and does not claim priority from any earlier application. It was published as GB 2568466 A on 22 May 2019.
- 2 Following a number of rounds of correspondence between the examiner and the applicant, and amendment of the claims, the examiner remains of the view that the claimed invention is excluded from patentability under section 1(2) of the Patents Act 1977 (the Act) and further, that the claimed invention does not involve an inventive step as required by section 1(1)(b) of the Act.
- 3 With the position unresolved the applicant asked for the matter to be the subject of a hearing. The examiner presented the outstanding matters in a pre-hearing report dated 19 April 2021. Ahead of the hearing, the applicant submitted detailed skeleton arguments on 18 May 2021. The hearing was held remotely on 26 May 2021. The applicant was represented by attorneys, Mr Matthew Westcott and Mr Alan Bhimani, both of Jaguar Land Rover.

The invention

- 4 The application is concerned with determining a minimum state of charge for an energy storage means of a vehicle, where the energy storage means is a (traction) battery and the vehicle is an electric vehicle, i.e. a hybrid electric vehicle or an all-electric vehicle.
- 5 In particular, the invention relates to a computer implemented method for determining a minimum state of charge for an energy storage means of a vehicle comprising the steps of determining (31) a routine use of charge of the energy storage means; determining (32) a user requirement for future driving of the vehicle;

predicting (33) a reduction in the state of charge (SoC) of the energy storage means associated with the user requirement in dependence on the determined routine; determining (35) a minimum state of charge for the energy storage means for enabling the user requirement to be satisfied in dependence on the predicted reduction; and providing (37) an output to the user indicative of a time requirement for increasing the state of charge of the energy storage means to a value at or above the minimum state of charge.

- 6 The application identifies advantages which the invention aims to address, such as 'range anxiety' for a user and also in providing a user with greater confidence in mid-journey recharging halts. The application particularly notes that a user recharging mid-journey will be better informed regarding how long they will have to wait thus avoid spending more time than is necessary to complete their journey.

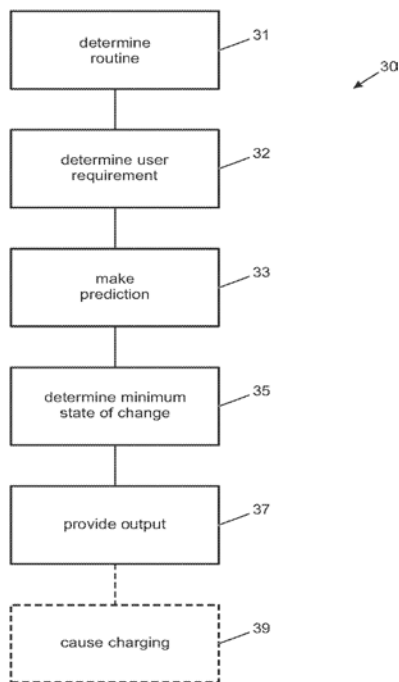


Fig. 3

The Claims

- 7 This decision is based on the definitive claim-set filed 16 November 2020. There are 15 claims, with Claim 1 reading as follows:

A computer-implemented method for determining a time requirement for increasing the state of charge of an energy storage means of a vehicle, the method comprising;

obtaining data indicative of a use of charge of the energy storage means and a current state of charge of the energy storage means;

determining a routine use of charge of the energy storage means using the data indicative of a use of charge of the energy storage means;

determining a user requirement for future driving of the vehicle;

predicting a reduction in the state of charge of the energy storage means associated with the user requirement in dependence on the determined routine;

determining a minimum state of charge for the energy storage means for enabling the user requirement to be satisfied in dependence on the predicted reduction; and

providing an output to the user indicative of a time requirement for increasing the state of charge of the energy storage means to a value at or above the determined minimum state of charge;

determining a second user requirement for future driving of the vehicle, and for the second user requirement:

predicting a reduction in the state of charge of the energy storage means associated with the second user requirement independence on the determined routine;

determining a second minimum state of charge for the energy storage means for enabling the second user requirement to be satisfied in dependence on the predicted reduction; and

providing a second output to the user indicative of a time required for increasing the state of charge of the energy storage means to a value at or above the second minimum state of charge,

wherein the output and the second output are provided together, and wherein each time requirement is indicative of a time at which or how long until the state of charge of the energy storage means is expected to be at the respective value.

Claims 10 & 11 define a controller, Claim 12 defines a vehicle system, Claim 13 defines a vehicle, Claim 14 defines a computer program and Claim 15 defines a non-transitory computer readable medium, all characterised by the method of Claim 1, and therefore stand or fall with it. The following assessments focus on Claim 1. I note that as currently drafted Claim 10 is dependent on itself. This does not affect my assessment of the matter at hand but will require amendment if I find in favour of the applicant.

Issues to be decided

- 8 The issues for me to decide are: (a) patentability, i.e. whether the claimed invention relates to excluded subject matter, and in particular whether the invention falls into section 1(2)(c) of the Patents Act 1977 as a program for a computer, and (b) whether the claimed invention involves an inventive step over the prior art, as required by section 1(1)(b) of the Act.

Exclusion as program for a computer – Section 1(2)(c)

The Law

- 9 The examiner has raised an objection under section 1(2) of the Act, that the invention is not patentable because it relates to excluded matter, a computer program as such. The relevant provisions of this section of the Act are shown in bold below:

1(2) It is hereby declared that the following (among other things) are not inventions for the purposes of this Act, that is to say, anything which consists of –

(a) a discovery, scientific theory or mathematical method;

(b) a literary, dramatic, musical or artistic work or any other aesthetic creation whatsoever;

*(c) a scheme, rule or method for performing a mental act, playing a game or doing business, **or a program for a computer;***

(d) the presentation of information;

but the foregoing provision shall prevent anything from being treated as an invention for the purposes of this Act only to the extent that a patent or application for a patent relates to that thing as such.

- 10 The examiner and the applicant agree that the assessment of patentability under section 1(2) is governed by the judgment of the Court of Appeal in *Aerotel*¹, as further interpreted by the Court of Appeal in *Symbian*².
- 11 In *Aerotel*, the court reviewed the case law on the interpretation of section 1(2) and approved a four-step test for the assessment of what is often called "excluded matter", as follows:

Step one: properly construe the claim

Step two: identify the actual contribution (although at the application stage this might have to be the alleged contribution)

Step three: ask whether it falls solely within the excluded matter

Step four: check whether the actual or alleged contribution is actually technical in nature.

- 12 Subsequently, the Court of Appeal in *Symbian* made clear that the *Aerotel* test is not intended to provide a departure from the previous requirement set out in case law, namely that the invention must provide a "technical contribution" if it is not to fall

¹ *Aerotel Ltd v Telco Holdings Ltd Ors Rev 1 (Aerotel/Macrossan) [2007] RPC 7*

² *Symbian Ltd's Application [2009] RPC 1*

within excluded matter. The *Aerotel* test has subsequently been endorsed by the Court of Appeal in its decisions in both *HTC*³ and *Lantana*⁴.

- 13 In addition, Lewison J (as he then was) set out, in *AT&T/CVON*⁵, five signposts that he considered to be helpful when considering whether a computer program makes a technical contribution. In *HTC* the signposts were reformulated slightly in light of the decision in *Gemstar*⁶. The signposts are:
- i) Whether the claimed invention has a technical effect on a process which is carried on outside the computer.
 - ii) Whether the claimed technical effect operates at the level of the architecture of the computer; that is to say whether the effect is produced irrespective of the data being processed or the applications being run.
 - iii) Whether the claimed technical effect results in the computer being made to operate in a new way.
 - iv) Whether the program makes the computer a better computer in the sense of running more efficiently and effectively as a computer.
 - v) Whether the perceived problem is overcome by the claimed invention as opposed to merely being circumvented

It should be clear that the signposts are merely guidelines; although they provide a useful aid in assessing the technical character of a claimed invention, they were not intended to provide a definitive test (as Lewison LJ's obiter remarks in paragraph 149 of *HTC* make clear). Several judgments have emphasised this point - John Baldwin QC (sitting as a Deputy Judge) in *Really Virtual*⁷ noted that the signposts, although useful, are no more than signposts and that there will be some cases in which they are more helpful than in others. Kitchin LJ made similar remarks in paragraph 51 of *HTC* that their usefulness does not mean they will be determinative in every case.

Argument and analysis

- 14 The examiner maintains that the claims define an invention which consists of a program for a computer, setting out his position most recently in the pre-hearing report. Detailed arguments against the examiner's position are contained in the applicant's responses to the examination reports and summarised in the applicant's skeleton arguments. These arguments were elaborated upon clearly and helpfully at the hearing by Mr Westcott.
- 15 The invention defined by the claims is embodied in software; that is to say, it is a program running on a computer. Thus, the invention is *prima facie* a program for a computer. Taking all these arguments into account, I must now determine whether the claimed invention relates solely to excluded subject matter under section 1(2).

³ *HTC Europe Co Ltd v Apple Inc* [2013] EWCA Civ 451

⁴ *Lantana v Comptroller-General of Patents* [2014] EWCA Civ 1463

⁵ *AT&T Knowledge Ventures' Application and CVON Innovations Ltd's Application* [2009] FSR 19

⁶ *Gemstar-TV Guide International Inc v Virgin Media Limited* [2010] RPC 10

⁷ *Really Virtual Co Ltd v UK Intellectual Property Office* [2012] EWHC 1086 (Ch)

Step 1: Properly construe the claims

- 16 Both examiner and applicant disagree on the construction of claim 1.
- 17 In his Pre-hearing report, the examiner considers the final construction of claim 1 as being best summed up by:

“a computer implemented method of taking two journeys the user wishes to make as an input, and in conjunction with the user routine (use of charge) and predicting the amount of charge required to fulfil each user requirement and presenting those to the user”.

- 18 In their skeleton arguments, the applicant submits that when properly construed, the claimed invention comprises:

“A computer implemented method for determining a time requirement for increasing the state of charge of an energy storage means of a vehicle, the method comprises:

obtaining data (from vehicle systems such as the state of charge monitor 260, user selectable subsystem usage monitor 280, etc) indicative of a use of charge of the energy storage means and a current state of charge of the energy storage means;

determining a routine of use of charge of the energy storage means using the data indicative of a use of charge of the energy storage means;

for each of a first and second user driving requirement:

- predicting a reduction in the state of charge of the energy storage means associated with the user requirement in dependence on the determined routine; and*
- determining a minimum state of charge for the energy storage means for enabling the user requirement to be satisfied in dependence on the predicted reduction, and*

outputting together to the user indications of a time at which or how long until the state of charge of the energy storage means is expected to be at the respective minimum state of charge for each user requirement.”

At the hearing, Mr Wescott took time to describe the invention, in particular, discussing how fuelling internal combustion engine (ICE) vehicles compare with/differ from the charging of electric vehicles. In particular, Mr Westcott expressed concerned with the examiner’s “oversimplified” construction of claim 1.

Before I can construe the claim, there are several points I need to consider, which I shall now do.

A routine of use of charge of the energy storage means

19 Mr Westcott stressed that the ‘use of charge’ extends beyond the ‘use of the vehicle’, which was terminology repeatedly used by the examiner in his reports, by pointing out that ‘use of charge’ is not limited to journeys and includes variables specific to ‘...a given vehicle and a given driver at a given time...’; the driving style of the user, how s/he has set up the various sub-systems such as heating, air conditioning; regenerative braking, prevailing weather conditions, etc, which all come into play. To my mind the ‘use of a vehicle’ (as per the examiner’s interpretation) includes journeys but is not necessarily limited to these, or to simply journey distance. Any historical record of routine travel using a vehicle will naturally include some element of user driving style and preferences, albeit indirectly, this being reflected at least in the typical charge-used-per-mile figure so-obtained. For instance, a vehicle regularly driven in mountainous terrain or in a desert city with its air conditioning working hard will record a poorer energy efficiency than a similar vehicle routinely used for short journeys in light traffic, and these differences will be reflected in the use of charge data for these respective vehicles. I therefore consider that while the examiner and applicant have represented this differently, I believe the intended scope is similar. In construing “use of charge” and “routine use of charge”, I am content that this takes into account routine use of the vehicle (distance etc as per the examiner) plus the driving style, air conditioning, regenerative breaking etc as per the applicant and as referred to by Mr Westcott on pages 1 & 2 of the skeleton arguments, and pages 10-12 and Fig 3 block 31 of the description.

Obtaining data indicative of a use of charge of the energy storage means

20 Mr Westcott commenting on the examiner’s construction of claim 1, sought to impress upon me that the step of “obtaining data” is crucial and should be included in the claim construction. Having considered the arguments, I am minded to agree, with claim construction being a matter of understanding the content of the claim.

21 I do not, though, take the attorney’s construction uncritically. The text relating to “obtaining data” in the applicant’s construction, for instance, specifies obtaining data ‘from on board systems’ and gives examples, but the claim is silent on this, defining only ‘obtaining data’. In the description this is historical data relating to use of the vehicle (See page 8 lines 2-3: “The state of charge monitor 260 or the controller 210 may be configured to determine a history of the state of charge of the battery 11.” Also see page 10 lines 22-25: “In some examples, determining a routine at block 31 comprises continually collecting data indicative of a current state of charge (SoC) of the battery 11 to determine a history of SoC. The controller 210 could be configured to obtain such data from the state of charge monitor 260, for example”). But there is nothing in the claim to define this limitation and as drafted it could equally relate to a future diary entry, for instance. I must therefore construe the claim broadly as including data from any source.

A user requirement and a second user requirement

22 Claim 1 as it currently stands, refers to “a user requirement” and a “second user requirement”. As currently claimed, these could be either alternative requirements or consecutive requirements (such as sections or legs of a longer journey). The description (in particular page 13 lines 4-15 and Fig. 4) appears to disclose alternative requirements which Mr Westcott confirmed at the hearing to be the intended meaning. However, as it stands the claim is not so limited.

Energy storage means

23 As per the examiner's interpretation, based also on the description page 7, line 7, this is taken to be the (traction) battery of the electric vehicle.

24 Taking all observations into account, I construe claim 1 as:

A computer implemented method for determining a time requirement for increasing the state of charge of an energy storage means of a vehicle, the method comprises:

obtaining data indicative of a use of charge of the energy storage means and a current state of charge of the energy storage means;

determining a routine of use of charge of the energy storage means using the data indicative of a use of charge of the energy storage means;

for each of a first and second user driving requirement:

- predicting a reduction in the state of charge of the energy storage means associated with the user requirement in dependence on the determined routine; and
- determining a minimum state of charge for the energy storage means for enabling the user requirement to be satisfied in dependence on the predicted reduction, and

outputting together to the user indications of a time at which or how long until the state of charge of the energy storage means is expected to be at the respective minimum state of charge for each user requirement.

Step two: identify the actual (or alleged) contribution

25 Again, there is no agreement between the examiner and the applicant on what is the contribution made by the invention. Jacob LJ outlined the considerations to be applied when identifying the contribution made by the claims, in paragraph 43 of *Aerotel*:

"The second step – identify the contribution - is said to be more problematical. How do you assess the contribution? Mr Birss submits the test is workable – it is an exercise in judgment probably involving the problem said to be solved, how the invention works, what its advantages are. What has the inventor really added to human knowledge perhaps best sums up the exercise. The formulation involves looking at substance not form – which is surely what the legislator intended."

26 The examiner considers the contribution to be:

"A computer implemented method of predicting the time required to charge an electric vehicle to meet a first and second requirement taking into account the routine cyclical use (of charge) of the vehicle. I do not see this as changing whether you restrict the routine to use of charge."

27 The applicant in their skeleton arguments, and again Mr Westcott at the hearing, submits the actual contribution made by the present invention to be:

“A computer implemented method for determining a time requirement for increasing the state of charge of an energy storage means of a vehicle by:

- *evaluating energy usage data obtained from vehicle systems to determine a routine of use of charge of the energy storage means;*
- *using said determined routine use of charge to determine a minimum state of charge of the energy storage means for enabling a plurality of user requirements to be satisfied; and*
- *outputting indications of time requirements for increasing the state of charge of the energy storage means to a value at or above the minimum state of charge for each user requirement.”*

28 Again, Mr Westcott was not convinced by the examiner’s interpretation of “use of charge” and therefore “routine use of charge of the energy storage means” as required by Claim 1, stressing that “routine cyclical use (of charge) of the vehicle” does not take account of variables relating to individual drivers such as their driving styles; preferences in relation to vehicle settings such as air conditioning, driving modes etc (and as discussed on page 3 of the applicant’s skeleton arguments).

29 Further at the hearing, Mr Westcott reminded me that from claim 1, the invention comprises *“predicting a reduction in the state of charge of the energy storage means associated with the user requirement in dependence on the determined routine”*, and he sought to stress that this could not provide any meaningful information about the reduction in the state of charge for the energy storage means for a defined future journey, if the “routine” is simply based on a “routine use of the vehicle” in terms of time and distance travelled.

30 As I’ve indicated early in my construction of Claim 1, I have taken both the examiner and applicant’s interpretations into account when construing “a routine of use of charge of the energy storage means”.

31 The examiner in paragraph 19 of his pre-hearing report has commented on the applicant’s view that *“collecting the current charging state of the vehicle is part of the contribution”*, saying *“I consider this to be implicit but given that obtaining the current battery state is an intrinsic step in a battery meter that is in almost every electric car known, I do not see it as part of the contribution.”*

32 Taking all observations into account, it’s my view that the contribution is to be found somewhere between the examiner and the applicant’s assessments:

A computer implemented method of predicting the time required to charge an electric vehicle to meet first and second user requirements determined by taking into account the routine of use of charge of the energy storage means, and subsequently outputting together, indications of time requirements for increasing the state of charge of the energy storage means to a value at or

above the minimum state of charge, for each of the first and second user requirements.

Steps 3 and 4: Does the contribution fall solely within excluded matter/is it technical in nature?

- 33 Clearly and as acknowledged by Mr Westcott at the hearing, the invention is implemented as a computer program. However, I must decide whether that is all it is, or whether it extends beyond a computer program as such.
- 34 The Court of Appeal in *Symbian* ruled that the question of whether the invention makes a technical contribution must be addressed when considering the computer program exclusion, although it does not matter whether that takes place at step 3 or step 4.
- 35 At this point it is useful to consider the *AT&T/CVON* signposts as they are a helpful aid in determining whether a computer program makes a technical contribution.
- 36 The examiner applied the signposts to his interpretation of the contribution, as set out in paragraphs 22-27 of the pre-hearing report, concluding that the contribution failed to satisfy any of the five signposts. In paragraph 28, the examiner concluded by stating that *"claim 1 of your application is considered to be excluded as a computer program under Section 1(2)(c) of the Act"* and that he had given *"due consideration to the remaining claims, of [your] application and [on] the view that they too are excluded under Section 1(2) of the Act."*
- 37 With the applicant not offering any analysis/reasoning of the contribution in respect of the signposts in their skeleton argument, I asked Mr Westcott for the applicant's view on this. He stressed that the signposts were only a guide to determining whether a contribution is technical in nature. I will consider the applicant's position further under Step 4 below.
- 38 I will now consider the signposts for the contribution as I have assessed it to be.

Signpost (i):

- 39 The output (information) is a prediction that is presented to a user on a screen. Whilst the output (information) being presented to the user may be considered "technical" in nature, this in itself (ie. technical information) does not confer a technical feature to the contribution or the invention. In effect, this amounts to presentation of information (also excluded but I note not formally objected to) – with there being no link to any technical step or control outside of the computer – everything that is happening is occurring internally of the computer. Essentially, it is a computer program taking in data, manipulating the data and presenting data (information) back to a user. There is no technical effect on a process which is carried on outside of the computer. In my view therefore, signpost (i) is not satisfied.

Signpost (ii):

- 40 Regarding signpost (ii) and in respect of the contribution as determined by the examiner, he asserted that it relies entirely on the data being processed and so

cannot meet this signpost. Similarly, I come to the same conclusion for the contribution as I have determined it to be. The program does not operate at the level of architecture of the computer. There is no suggestion that there is anything particular in the computing apparatus being used and there is nothing in the claims or specification which suggests an effect occurs at the architectural level. The program does not change how the computer runs internally (in practice, this means in the sense of the operation of the processor, the cache memory, or other internal components of the computer). There is nothing that is affected below the application layer of the computer arrangement. Therefore, in my view signpost (ii) points away from there being a technical contribution.

Signposts (iii) and (iv):

- 41 Signpost (iii) emphasises that the effect must be more than just the running of a program or application on a general-purpose computer – the computer itself must operate differently than it did before as a result of the program being run.
- 42 Signpost (iv) is approached in a similar way to signpost (iii). The computer must operate more efficiently and effectively as a result of running the program. Again, this must be the computer as a whole, rather than the individual program.
- 43 When considering signposts (iii) and (iv), the examiner concluded “[t]here is no new computing apparatus nor is it ever suggested that the underlying computing apparatus operates any differently to now.” concluding that “[n]either signpost offers any assistance to the applicant.” (pre-hearing report, para 25). I also hold the same view as the examiner, for the contribution as I have determined it to be. Regarding signpost (iii), I consider the computer to be operating in the usual way to perform the instructions of the program in the same way as it would for any program. Regarding signpost (iv), I consider the computer itself does not run more efficiently in carrying out the instructions of the computer program. In my view, both signposts (iii) and (iv) are not met and point away from there being a technical contribution.

Signpost (v):

- 44 The examiner considered this briefly, discussing his analysis of the problems to be solved in paras 26 and 27 of the pre-hearing report.
- 45 In paragraph 26, the examiner observes that the *“the fifth signpost asks whether the contribution solves a problem or circumvents it. Taken at face value the problem here is one of battery charge. This application does not solve that problem it merely provides a circumvention by telling the user how long to charge it for to meet two requirements. It does not solve the battery charge problem.”*

In paragraph 27, the examiner also identified that the problem could *“alternatively”* be of *“range anxiety”* and whilst recognising this as a *“fraught issue for electric vehicle users”*, asserted that *“range anxiety”* is not a technical problem to solve.

The applicant disagrees with the examiner (at page.4 lines 26-32 of the skeleton arguments), dismissing identification of the problem to be solved as being *“one of battery charge”* and *“of range anxiety”*, because the examiner has failed to make any

attempt to properly and objectively address the contribution made by the present invention.

- 46 Regarding a problem to be solved based on battery charge, I recognise that the current application is not concerned with batteries and battery charge per se; however, I agree with the examiner's assertion that the contribution provides a circumvention by telling the user how long to charge the battery for, to meet two requirements.
- 47 Regarding a problem to be solved based around range anxieties as expressed by the examiner, whilst I can see that presenting the charging information would be useful information for the user to have, I also agree that presenting to a user, charging scenario information itself is not a technical solution to a problem that in itself is also not technical in nature. The output is merely one of information and so the claimed invention does not overcome a technical problem.
- 48 Looking at the fourth step, as discussed above in relation to the signposts, I do not consider the contribution to be technical in nature.
- 49 Having considered all the signposts, none of them in my view, point to the contribution as making a technical contribution. Taking a step back and looking at the contribution as a whole, I consider it relates wholly to a computer program. In a simplistic view, the program is taking data, performing a calculation on the data and then presenting output (ie. information) to a user. Presentation of information also, to a user falls with excluded subject matter, though this was not raised formally as an objection by the examiner. Even though the information being presented to the user might be considered technical in nature, this is not enough to take the invention outside of the exclusion. Presentation of information is not technical in nature even if the information being presented is technical in nature. I cannot identify anything in claim 1 which confers a technical effect/feature on the invention as claimed.
- 50 At this point, I will now give consideration to the applicant's assessment of Step 4: check whether the contribution is actually technical in nature, which I stated I would do in paragraph 37 above.
- 51 The applicant's position is set out in their skeleton arguments and I'm grateful to Mr Westcott for taking me through the key points at the hearing. The applicants submit that the claimed invention solves a technical problem and as such provides a contribution that is inherently technical in nature, with the invention thus not being excluded from patentability under Section 1(2)(c) of the Act.
- 52 The applicant has put forward an argument based on an analogy with *BLO/029/19 General Electric Company (GEC) "Monitoring and diagnosing generator operation"*, raising two points based on this decision.
- 53 Firstly, referencing paragraph 23, *"that the data and the fault code that was output were not isolated entities which existed independently of the apparatus in which they were used. Instead, they were an integral part of a method of identifying faults in a generator using data obtained from sensors and the contribution must reflect that"*. The applicant reflects *"accordingly, the contribution for the present application must also reflect that the data obtained (from vehicle systems) in relation to a use of*

charge of the energy storage means and a current state of charge of the energy storage means are an integral (and technical) part of the method”.

- 54 Secondly, referencing and quoting from paragraph 26, *“It is trite law that giving visual indications automatically about conditions prevailing in an apparatus or system is basically a technical problem”*, taken from paragraph 87 of *Aerotel* quoting *IBM/Text processing (1988) T 115/85* referenced therein, *“as part of the analysis of what is regarded as technical from earlier decisions”*. Drawing analogy with the current invention/contribution, the applicant asserts that *“providing indications automatically to a user about conditions prevailing in in an apparatus, said conditions being in the form of time requirements for increasing the state of charge of the energy storage means for meeting first and second user requirements, is fundamentally a technical problem”*.
- 55 The applicant asserts further that “prevailing conditions” in respect of the present invention include *the routine use of charge of the energy storage means, the current state of charge of the energy storage means and the current available rate of charging for the energy storage means and that these prevailing conditions are all assessed and evaluated to provide indications to the user about the length of time required to achieve the necessary minimum state of charge to satisfy the user requirements*. The applicant disagrees with the examiner’s assertion in the pre-hearing report that *“At no point is the operation of the apparatus being evaluated”*, with the applicant pointing out that in the present invention, *“data indicative of a use[r] of charge of the energy storage means and a current state of charge of the energy storage means is obtained and used to determine a routine use of charge of the energy storage means”* with *“This clearly an evaluation of the operation of the apparatus”*.
- 56 I have taken a closer look at the examiner’s position and note that he has also considered this point in his examination report of 29th January 2021, summarising later in the pre-hearing report. There, noting the applicant’s view that the contribution should refer explicitly to the conditions prevailing in the apparatus on the basis of GEC, but disagreeing on this point, since the claim makes no reference to the prevailing conditions and maintaining his position on his assessment of the contribution. I note the examiner observed a fundamental difference between the situation in *GEC* and the current application, notably that in *GEC*, real world data i.e. the readings of the sensor were being read by a sensor “on the operation of the generator” and evaluated to identify an error in the generator, and agreeing this was about understanding the prevailing conditions in the apparatus.
- 57 Therefore to understand the examiner disagreement with the applicant applying this situation to the current application and that at “no point, is the operation of the apparatus (the vehicle) being evaluated” I take note that of the context under which the examiner has made this assertion i.e. *“what is being done here is a series of calculations to predict a charging time in response to a possible journey. At no point does the application give a view of the prevailing conditions of the vehicle, with GEC not helping the applicant’s position”*.
- 58 Taking the above factors into careful consideration, I’m not persuaded by the applicant’s assertion that the invention solves a technical problem and provides a

contribution that is inherently technical in nature since there is no technical step/feature in the invention as claimed.

- 59 I conclude that the contribution falls solely within the exclusion of s1(2)(c) of the Act as a computer program, with Claim 1 thus being excluded as a computer program as such.

Dependent Claim 4

- 60 Claim 4 reads: *“The method as claimed in any preceding claim, comprising: charging the energy storage means to the value, in dependence on receiving a user confirmation input.”*
- 61 In my opinion, “charging the energy storage means to the value” – is a step which conceivably may take claim 1 out of the section 1(2)(c) exclusion if the features of claim 4 are incorporated into claim 1. This may take the claimed invention to beyond just a computer program as such. Charging an energy storage means (battery) is a technical step in itself and would confer the scope of claim 1 to this technical effect, and potentially take claim 1 outside of the exclusion.

Lack of inventive step – section 1(1)(b)

The Law

- 62 The examiner has also maintained an objection under section 1(1)(b) of the Patents Act 1977 that the invention does not involve an inventive step. The relevant provisions of the Act are shown below:

Section 1(1): A patent may be granted only for an invention in respect of which the following conditions are satisfied, that is to say –

(a) the invention is new;

(b) it involves an inventive step;

(c) it is capable of industrial application;

(d) the grant of a patent for it is not excluded by subsections (2) and (3) or section 4A below;

and references in this Act to a patentable invention shall be construed accordingly.

and

Section 3: An invention shall be taken to involve an inventive step if it is not obvious to a person skilled in the art, having regard to any matter which forms part of the state of the art by virtue only of section 2(2) above (and disregarding section 2(3) above).

Section 2(2) explains what is meant by the state of the art for the purposes of inventive step:

The state of the art in the case of an invention shall be taken to comprise all matter (whether a product, a process, information about either, or anything else) which has at any time before the priority date of that invention been made available to the public (whether in the United Kingdom or elsewhere) by written or oral description, by use or in any other way.

- 63 It is well-established that the structured approach first set out in *Windsurfing*⁸ and reformulated as the Windsurfing/Pozzoli test in *Pozzoli*⁹ should be followed in assessing inventive step. The Windsurfing/Pozzoli approach reads as follows:

(1)(a) Identify the notional “person skilled in the art”
(1)(b) Identify the relevant common general knowledge of that person;
(2) Identify the inventive concept of the claim in question or if that cannot readily be done, construe it;
(3) Identify what, if any, differences exist between the matter cited as forming part of the “state of the art” and the inventive concept of the claim or the claim as construed;
(4) Viewed without any knowledge of the alleged invention as claimed, do those differences constitute steps which would have been obvious to the person skilled in the art or do they require any degree of invention?

- 64 According to section 125(1) of the Act, the claims are interpreted as they would be understood by the skilled person in light of the description and any drawings in the application as filed:

For the purposes of this Act an invention for a patent for which an application has been made or for which a patent has been granted shall, unless the context otherwise requires, be taken to be that specified in a claim of the specification of the application or patent, as the case may be, as interpreted by the description and any drawings contained in that specification, and the extent of the protection conferred by a patent or application for a patent shall be determined accordingly.

- 65 I must therefore interpret the claims in the light of the description and drawings. It is well established that this is done through the eyes of the person skilled in the art, thus determining what the skilled person would understand the patentee to be using the language of the claim to mean.

Argument and analysis

Steps 1(a) and 1(b): Identify the person skilled in the art and their common general knowledge

- 66 The examiner’s assessment is given in the pre-hearing report as:

“The skilled person is one familiar with the use of batteries in electrical vehicles and how to calculate the range of use. Their common general knowledge would necessarily involve an understanding of how different journeys would require different levels of charge or to put it another way fuel.

⁸ *Windsurfing International Inc v Tabur Marine (Great Britain) Ltd* [1985] RPC 59

⁹ *Pozzoli SPA v BDMO SA* [2007] EWCA Civ 588

In reality, they would be little different to the engineer working on ICE vehicles who would be able to determine the fuel requirements for a particular journey. They would also be well aware of how to measure the current battery level of a vehicle given this is a standard feature on any EV) in that it mirrors the fuel gauge of an ICE car.”

- 67 Mr Westcott has not, either in the applicant’s skeleton arguments or at the hearing itself, formally laid out an alternative assessment, but has disagreed with some aspects of the examiner’s summary. Foremost amongst these aspects is the examiner’s reference to there being a parallel between use of charge and use of fuel in a conventional internal combustion engine (ICE) driven vehicle. He observes that there are significant additional factors in an EV, such as the use of re-generative braking, the relative re-fuelling speeds (and hence different motivating factors) and so on.
- 68 In my reading of the examiner’s definition, I am inclined to take the comments in respect of there being a parallel between charge use and fuel use more as an explanatory note than as a statement of definition, and I take due regard to Mr Westcott’s comments in interpreting this aspect.
- 69 Although not raised by Mr Westcott in his arguments, I also observe some critical omissions in the examiner’s assessment. The invention is concerned not only with the *use* of charge, but also with the *recharging* of the battery. I also agree with Mr Westcott that the sub-systems of an electric vehicle add a level of complexity to the consideration of use of charge which is lacking in an ICE vehicle, where (at least to a first approximation) electrical power is a ‘free’ by-product and energy capture from braking is not available.
- 70 In my view, the skilled person (or team) is familiar with the use of energy storage means (essentially batteries) in electrical vehicles and how to calculate the range available from a given charge. They would also be familiar with the process of re-charging batteries in a variety of differing situations and conditions. Their common general knowledge would include the effect of the use of vehicle sub-systems (heating, air-conditioning, re-generative braking etc) on the vehicle energy store, and they would be aware of how different driving conditions (including different drivers) will have a significant effect on the overall energy consumption of the vehicle. They would further appreciate the factors governing the speed at which a battery may be recharged in a and electric vehicle.

Step two: Identify the inventive concept of the claim in question or if that cannot readily be done, construe it

- 71 I have already discussed how I have construed Claim 1 when discussing excluded matter above. For ease of reference I repeat it here:

A computer implemented method for determining a time requirement for increasing the state of charge of an energy storage means of a vehicle, the method comprises:

obtaining data indicative of a use of charge of the energy storage means and a current state of charge of the energy storage means;

determining a routine of use of charge of the energy storage means using the data indicative of a use of charge of the energy storage means;

for each of a first and second user driving requirement:

- *predicting a reduction in the state of charge of the energy storage means associated with the user requirement in dependence on the determined routine; and*
- *determining a minimum state of charge for the energy storage means for enabling the user requirement to be satisfied in dependence on the predicted reduction, and*

outputting together to the user indications of a time at which or how long until the state of charge of the energy storage means is expected to be at the respective minimum state of charge for each user requirement.

72 The examiner has defined the inventive concept in paragraph 33 of the pre-hearing report as:

“The inventive concept is seen as one of predicting a charge time for a battery for two requirements, taking into account cyclical use data for the vehicle and presenting a charging time for each requirement to the user.”

73 The applicant has countered by defining the inventive concept on page 6 of their skeleton argument as:

“obtaining data (from vehicle systems such as the state of charge monitor 260, user selectable subsystem usage monitor 280, etc) indicative of a use of charge of the energy storage means and a current state of charge of the energy storage means;

determining a routine of use of charge of the energy storage means using the data indicative of a use of charge of the energy storage means;

for each of a first and second user driving requirement:

predicting a reduction in the state of charge of the energy storage means associated with the user requirement in dependence on the determined routine; and

determining a minimum state of charge for the energy storage means for enabling the user requirement to be satisfied in dependence on the predicted reduction, and

outputting together to the user indications of a time at which or how long until the state of charge of the energy storage means is expected to be at the respective minimum state of charge for each user requirement.”

74 It was briefly discussed during the hearing that the inventive concept is related, but not identical, to the contribution as defined when considering excluded matter.

75 Taking the above into consideration, I consider the inventive concept to be:

Determining a pattern of charge usage in an electric vehicle, predicting at least two possible user requirements, calculating a time required to increase the battery charge to a level needed to satisfy each said user requirements, and subsequently presenting the results as alternatives to the user.

Step three: Identify what, if any, differences exist between the matter cited as forming part of the “state of the art” and the inventive concept of the claim

76 The examiner cited 5 prior art documents as being relevant to inventive step, as follows:

US 2014/0336965 A1	MORI
US 2017/176195 A1	GM
US 2017/261331 A1	TOYOTA
US 2014/006137 A1	MELEN
US 2017/0030728 A1	TESLA

The arguments laid out in the examiner’s examination reports highlight different features of each document and seek to assert that these taken together show that much of the claimed invention is known. However, this approach does not systematically follow the *Windsurfer/Pozzoli* test, and so I have taken a fresh look at the matter. First, I must identify the closest prior art.

- 77 Both GM and TESLA disclose systems which model charge consumption of alternative routes to optimise energy consumption.
- 78 Charging is considered in GM in the context of planning in-route charging points and in vehicle-to-grid transactions at times of high electricity demand (ie selling energy to the grid when prices are high and re-charging when they are low). Recharge time is considered, since it must be possible to recoup any energy sold to the grid before the next projected journey, but there does not appear to be any disclosure that this information may be presented to the user of the vehicle.
- 79 In TESLA, charge levels are assessed to confirm whether a manually entered alternative route is achievable at the existing charge level of the vehicle batteries. Charging stations (‘waypoints’) along a route may be taken into account and will inevitably require the calculation of an expected re-charging time en route. This information is presented to a user in response to the user entering a desired alternative route, and as such is presented later than the primary route data.
- 80 TOYOTA is concerned more directly with the charging of a vehicle using predicted journey start time based on a history of when a charge cable is disconnected each day. The system then selects a charging time ‘slot’ prior to this predicted start time which will give the lowest cost re-charge. There does not appear to be any discussion of alternative approaches or the presentation of any data to the user beyond a graphical user interface for control of the system.
- 81 MELEN also addresses the matter of vehicle traction battery charging. Noting in particular figures 5A and 5B, this document collates battery state data, charging configuration data, user profile data, and current location to estimate a future trip (step 514). Alternative charging profiles are presented to the user for selection. A

single use requirement therefore results in two charge time estimates being presented to the user.

- 82 MORI discloses a charging system in which historical use data is used to determine likely maximum charge requirements for a future time period presented as a 'rule curve'. The shape of these rule curves can represent alternative use requirements which the system is adapted to allow for in controlling the level of charge maintained in a vehicle battery. The results of this process may be displayed to the user (see paragraph 68).
- 83 It seems to me that MORI is the closest prior art to the present invention, and MELEN is also sufficiently similar to be worthy of consideration as a starting point. My analysis will therefore consider both MORI and MELEN as alternative candidates for closest cited prior art.

Differences from MORI

- 84 MORI describes a charge management system for a vehicle which uses historical data to map likely minimum charge levels for a battery over a time period such that charging can be carried out in a timely manner. I note that at paragraph [0039] MORI is explicit that the *'travel history'* equates to *'information concerning the past power consumption of the vehicle.'* As I noted earlier in this decision, I consider that such a record will implicitly take account of variables such as driving style, local terrain/weather, use of subsystems such as re-generative brakes, etc
- 85 Various mathematical approaches are described for analysing the vehicle's prior usage patterns in order to generate a "rule curve" as identified by the examiner in his pre-hearing report. From my study of the citation, I can see that this "rule curve" in essence represents the charge required to be in the battery to support any journey that is likely to be made according to an analysis of the history of the vehicle/driver. The system compares the current level of charge with the charge required by the "rule curve" at a point in the future to identify the time at which charging must commence given a known rate of charge.
- 86 In some circumstances, the "rule curve" can have multiple peaks, as shown in figure 9. Each of these peaks implicitly represents a likely future use of charge which may need to be accommodated by the vehicle battery, and it can be seen that each peak can be met by commencing charging at different times, the charge lines being represented by the straight lines drawn at angle θ (the charge rate) and tangential to the peaks of the curve. Given the available charge rate and the shape of the curve, it is apparent that it would not be possible to satisfy the charge requirement of the second peak, and then re-charge in time to satisfy the third peak. Since this is the case, the second and third peaks, at least, can be regarded as alternative requirements.
- 87 Paragraph 74 gives further detail of how MORI addresses these multiple peaks. Again referring to figure 9, it can be seen that the second peak has a discharge line at angle ϕ which represents the system's ability to extract charge for other purposes once the time of the second peak has passed, and if the projected use represented by that peak has not occurred. This intersects with the third charging line at the 'estimated discharge stop time', at which point the system recommences charging in

order to achieve the third charge peak. It follows from this that MORI, while considering multiple possible journeys, is adapted to maintain charge at a level where the available charge is ***always sufficient for any likely single journey.***

- 88 At the hearing, Mr Westcott indicated that with respect to the cited documents he was content to rely primarily on the observations made in his skeleton arguments. MORI is discussed on pages 8-10 of these, and in particular page 9 includes two lists of features which it is alleged do not appear in the citation. The first of these focusses on the 'user requirements' of claim 1. Here, I am inclined to think that while MORI does not identify multiple specific journeys, the "rule curve" may still be regarded as representing multiple generalised journeys – a 'worst case scenario', to mirror the phrase used by Mr Westcott on page 10. I agree, however, with Mr Westcott's second list of missing features – the first and second outputs do not appear in MORI, which controls the charge level of the vehicle battery without requiring notification of the user.
- 89 In summary, the difference between MORI and the current claim 1 therefore appears to be that claim 1 offers the user firstly a choice of future specific requirements (predicted based on usage history) and secondly information regarding the time required to charge the battery for each, while MORI assesses time factors involved with providing sufficient charge to enable the vehicle to satisfy all/any likely requirements based on an assessment of usage history and without giving any output to the user.

Differences from MELEN

- 90 Turning to MELEN, this discloses a system which determines, from historical usage data of a vehicle, a likely future use requirement and hence charge requirement for a battery. Contrary to the applicant's suggestion in his skeleton arguments, I consider that a prediction of the reduction in state of charge during the predicted requirement and a corresponding minimum state of charge are both implicit in this. There is, though, only disclosure of a single requirement being calculated; while two or more outputs are considered, these relate to alternative charging strategies targeting that single requirement.
- 91 The document allows for the user to modify the presented strategies via a graphical user interface. In reality it is likely that if such a modification is required it would be because the user has an alternative requirement in mind, but this is never stated explicitly and such an alternative is not determined by the vehicle system itself but taken as an external input.
- 92 The chief difference between MELEN and the current claim 1 can therefore be summarised as being that MELEN offers two alternative *charging* strategies for a *single* predicted future requirement, while the current claim 1 defines the offering of two alternative future requirements each with its own charging time parameters.

Step four: Viewed without any knowledge of the alleged invention as claimed, do those differences constitute steps which would have been obvious to the person skilled in the art or do they require any degree of invention?

From MORI

- 93 The overall thrust of MORI appears to be (as observed by the examiner in his reports) one of releasing the user from making decisions regarding battery charging, saying that the user can “reliably us[e] the vehicle without worrying about the battery condition during travel.’ The invention of current claim 1, on the other hand, offers the user more information and more freedom of choice, in particular allowing the selection of a charging schedule which is tailored to the actual vehicle use required. It also provides the freedom to elect to charge a vehicle less than MORI would dictate should the user choose to specify a journey which is less resource-intensive than expected for a given period.
- 94 Thus, although MORI contains many of the features defined in the current claim 1, the way that that they are directed to a different purpose inclines me towards the view, expressed by the applicant on page 10 of their skeleton arguments, that MORI teaches away from the current invention. In essence, MORI is directed to providing a reasonable safety-margin of charge to ensure that any likely journey may be made, while the current claims seek to provide information which allows the user to manage journeys with a minimal safety-margin. It seems to me that this represents a reversal in thought process which qualifies as an inventive step.

From MELEN

- 95 I have noted that MELEN lacks disclosure of a second prediction of a user requirement and that while an alternative requirement may be considered, this would be manually input by a user and not automatically predicted by the system. The assessment of inventive step therefore hinges on whether adding and automatically generated second prediction would be an obvious step. On balance, I am satisfied that MELEN teaches away from this, since the ability to accept a user-defined alternative largely renders automatically providing alternative requirements redundant. Also, the provision of charging strategies for alternative requirements occurs, in MELEN, at differing times, with only alternative charging strategies for a single use requirement being provided simultaneously. Therefore, I also find Claim 1 inventive over MELEN.
- 96 In conclusion, I consider Claim 1 as I have construed it represents an inventive step over the cited prior art. Since the other independent claims are characterised by the same subject matter, it follows that they also have an inventive step over the prior art.

Conclusion

- 97 I find that the invention of Claim 1 as it currently stands is excluded from patentability under section 1(2) as a computer program as such. Furthermore, I find that the invention of Claim 1 involves an inventive step and meets the requirement of section 1(1)(b).
- 98 The application therefore as it currently stands does not comply with section 18(3). However, I am not going to refuse at this stage.
- 99 On considering the dependent claims, there may be scope for the applicant to amend to overcome the section 1(2)(c) objection.

- 100 I therefore remit the application to the examiner to continue processing of this application.
- 101 The applicant is afforded 2 months from the date of this decision to make suitable amendments to Claim 1, to address the excluded matter objection. In the event that suitable amendments are not forthcoming or cannot be agreed, the application will be refused as it stands at the date of the hearing, for not meeting the requirements of section 1(2)(c) and for failing to comply with section 18(3).

Appeal

- 102 Any appeal must be lodged within 28 days after the date of this decision.

C L Davies

Deputy Director, acting for the Comptroller