

PCA Case No. 2023-01

IN THE MATTER OF  
THE INDUS WATERS WESTERN RIVERS ARBITRATION

- before -

THE COURT OF ARBITRATION CONSTITUTED  
IN ACCORDANCE WITH THE INDUS WATERS TREATY 1960

- between -

THE ISLAMIC REPUBLIC OF PAKISTAN

- and -

THE REPUBLIC OF INDIA

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CERTIFIED TRANSCRIPT  
(HEARING FOR THE SECOND PHASE ON THE MERITS)

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**COURT OF ARBITRATION:**

Professor Sean D. Murphy (Chairman)  
Professor Wouter Buytaert  
Professor Jeffrey P. Minear  
Judge Awn Shawkat Al-Khasawneh  
Dr. Donald Blackmore

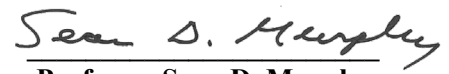
**SECRETARIAT:**

The Permanent Court of Arbitration

ON BEHALF OF THE COURT OF  
ARBITRATION:

CERTIFIED PURSUANT  
TO  
PARAGRAPH 19 OF ANNEXURE G

3 FEBRUARY 2026

  
Professor Sean D. Murphy  
Chairman

In the matter of an arbitration  
pursuant to Article IX and Annexure G  
of the Indus Waters Treaty 1960  
PCA Case No. 2023-01

Permanent Court of Arbitration  
Peace Palace  
The Hague  
The Netherlands

Day 2 Tuesday, 3 February 2026  
Hearing on the Second Phase on the Merits

Before:

PROFESSOR SEAN D MURPHY  
HE JUDGE AWN AL-KHASAWNEH  
DR DON BLACKMORE  
PROFESSOR JEFFREY P MINEAR  
PROFESSOR WOUTER BUYTAERT

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BETWEEN:

THE ISLAMIC REPUBLIC OF PAKISTAN

-and-

THE REPUBLIC OF INDIA

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Transcript produced by Trevor McGowan,  
Georgina Vaughn and Lisa Gulland.  
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12:24 1 Tuesday, 3 February 2026  
 2 (1.03 pm)  
 3 THE CHAIRMAN: I think we are ready to undertake Day 2 of  
 4 our hearing. This is the second round of submissions by  
 5 the Government of Pakistan. I see that Sir Daniel is at  
 6 the podium and so I open the floor to you, sir.  
 7 Second-round submissions on behalf of  
 8 the Islamic Republic of Pakistan  
 9 SIR DANIEL: Thank you very much, Mr Chairman. It is very  
 10 good to be back before you.  
 11 I have a sense that over the course of the last  
 12 18 hours, which we thought was an enormous amount of  
 13 time, that time always has to be inferred, and is never  
 14 sufficient. So maybe this harkens back to the first  
 15 stage of the proceedings.  
 16 You will see one of our members is still coming in.  
 17 As I say, it's very good to be back before you,  
 18 after yesterday's session, to give us an opportunity to  
 19 be responsive to your questions and, I say right at the  
 20 outset, also to allow us to recalibrate our submissions  
 21 and our final submissions with an appreciation of  
 22 the issues that are in the forefront of your minds. We  
 23 found the proceedings yesterday to be extremely helpful,  
 24 and the points on which you put your fingers in your  
 25 questions have caused us to think further.

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13:07 1 in relation to the scheme of our submissions, I will  
 2 also make some substantive opening remarks for about  
 3 20-25 minutes; I don't propose to be on my feet much  
 4 longer.  
 5 I will then be followed by Mr Peter Rae. As he was  
 6 cut short yesterday a little with his concluding  
 7 remarks, and as we anticipate that you may have further  
 8 questions to put to him, we have given him the lion's  
 9 share of the time available to us, of around about  
 10 50 minutes, perhaps a little bit more than that.  
 11 We then propose that Dr Greg Morris will follow  
 12 Mr Rae to make some further submissions from  
 13 an engineering perspective in a different voice, picking  
 14 up on some of the points that were raised in questions  
 15 yesterday. We've allocated to Dr Morris about  
 16 25 minutes or so of the time available to us, although  
 17 allowing a little flexibility beyond this in case there  
 18 may be questions from the Court.  
 19 Dr Miles will follow Dr Morris, once again acting as  
 20 a bridge between the engineers and the lawyers, for  
 21 about 35 minutes or so.  
 22 Dr Miles will then be followed by Professor Webb,  
 23 who will probably need around about 25 minutes or so for  
 24 her submissions.  
 25 I will then come back to the podium and take you

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13:05 1 So to this end, let me say right at the outset -- as  
 2 I mentioned yesterday, but just to revisit the point --  
 3 that we have indeed revisited our final submissions with  
 4 a view not just to adding the points that I referenced  
 5 yesterday, but to refining and refocusing them rather  
 6 more sharply on the key elements that we think need to  
 7 be addressed in your award on this Second Phase.  
 8 In saying this, let me make the point again that the  
 9 template of our submissions in these proceedings is not  
 10 ours but yours. Our template was in the First Phase.  
 11 You've given us a template to address; we are trying to  
 12 address [it] as best we can. So we are not, in a sense,  
 13 advancing a case of our own making, but endeavouring to  
 14 be responsive to the analytical gap that you identified  
 15 in the methodology for the calculation of maximum  
 16 pondage that must be applied. If our responses  
 17 yesterday on one or two questions might have come across  
 18 as, "We're not quite sure", that is a reflection that we  
 19 are still casting around in an endeavour to assist the  
 20 task of completing the methodology.  
 21 We have about three and a half hours for the  
 22 second-round submissions, allowing a little bit of time  
 23 within that for the Chairman's concluding remarks, and  
 24 we propose to proceed as follows.  
 25 After I've made some further housekeeping points, or

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13:08 1 through, walk you through our revised final submissions  
 2 briefly, before the Agent reads these formally into the  
 3 record.  
 4 Then our submissions in this phase of the case will  
 5 be closed by our Agent, Pakistan's Attorney General, who  
 6 will conclude our case with some very special brief  
 7 closing remarks, and will read our revised final  
 8 submissions into the record, and we will have a signed  
 9 copy to be handed to the Secretariat.  
 10 Mr Chairman, I have identified our rough timing  
 11 allocations for you. As we work through our  
 12 submissions, we, on our side of the bar, will need to  
 13 allow appropriate time for the speakers in the lower  
 14 orders of the timeline to make their submissions, and  
 15 we will therefore try to be attentive to the time  
 16 constraints in questions and answers to those who will  
 17 be speaking first. If I may, Mr Chairman, if we become  
 18 concerned that questions and answers, for example, to  
 19 Mr Rae or to Dr Morris may put at risk the time  
 20 available to Dr Miles or Professor Webb for their  
 21 submissions, I hope it will be okay if I interject from  
 22 my place in the corner of the room just to alert them  
 23 that there will be a need to pass the baton.  
 24 But in this regard, Mr Chairman, I have a quick  
 25 point of enquiry to you.

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13:10 1 We are endeavouring to hold ourselves to the time  
 2 allocation in Procedural Order No. 18 for the  
 3 second-round submissions that would lead to a close of  
 4 the Second Phase portion of the hearing at 5 o'clock.  
 5 That's what's prescribed in the schedule. We note  
 6 though that there is a reserve time beyond 5.00 pm in  
 7 the hearing schedule, described as "Contingency Time".  
 8 I think the expectation is that that contingency time  
 9 will be time available for case management conference  
 10 issues for next phases, PO19, perhaps the submission on  
 11 further phases that we put in on Sunday.  
 12 My quick question though is that if you have  
 13 extensive questions to counsel which risk us going  
 14 beyond the 5 o'clock deadline for this phase, would you  
 15 envisage allowing us or inviting us to make use of the  
 16 contingency time to address those questions? We want to  
 17 be as fulsome as possible in response to the Court's  
 18 enquiries. We also want to make sure we don't miss the  
 19 opportunity to address issues that perhaps we've left to  
 20 the second line of counsel.  
 21 THE CHAIRMAN: Sir Daniel, I think that, first of all,  
 22 I might just emphasise that the value of the submissions  
 23 this afternoon will be to focus on the questions that  
 24 the Court had, as opposed to any repetition of earlier  
 25 arguments, and I assume you are proceeding on that

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13:13 1 questions from yesterday, yes, indeed. I should say --  
 2 and this will become very apparent from my substantive  
 3 remarks and then from those of my colleagues to  
 4 follow -- that we concluded that it would not be useful  
 5 to you for us simply to adopt a kind of seriatim  
 6 approach, here are the questions and here are the  
 7 answers, but we are trying to address all of the  
 8 questions in the context of a more overarching  
 9 submission which identifies the questions that seem to  
 10 be at the core of this phase of the proceedings, to try  
 11 and focus them.  
 12 I think we came out of the session yesterday very  
 13 much illuminated with the appreciation that perhaps  
 14 there was a very broad canvas of issues that were  
 15 potentially in the frame, and that there would be some  
 16 utility in our trying to narrow those, including from  
 17 our perspective. So that's the approach that we've  
 18 adopted.  
 19 Mr Chairman, the last housekeeping point that  
 20 I make -- and I think this is anticipated by what both  
 21 you and I have just said -- is that I will be reserving  
 22 all of our observations on either next-phase issues or  
 23 PO19 issues to the contingency CMC period, rather than  
 24 addressing them now.  
 25 So with that, I turn to my substantive remarks.

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13:12 1 basis.  
 2 With that in mind, I'll say two things. One is:  
 3 I don't anticipate myself having significant amounts of  
 4 concluding remarks that will require significant time,  
 5 and so you might bear that in mind as perhaps giving you  
 6 a little bit more leeway than you might otherwise be  
 7 anticipating.  
 8 And then secondly, I don't see any difficulty with  
 9 us, if need be, particularly based on further questions  
 10 from the Court, extending somewhat past the 5 o'clock  
 11 hour. Indeed, I think for purposes of this phase, it's  
 12 extremely important for the Court to have an opportunity  
 13 to ask the questions it feels it needs to ask, and for  
 14 Pakistan to have an opportunity to respond to it.  
 15 Let's hope that it's not too much into contingency  
 16 time, because I do think that there are other important  
 17 issues we want to discuss. But I don't see the  
 18 5 o'clock hour as a definitive endpoint for the  
 19 conversation.  
 20 SIR DANIEL: Thank you very much, Mr Chairman. We hope and  
 21 expect that we will meet that 5 o'clock deadline very  
 22 comfortably. It was simply for my clarification as to  
 23 whether I need to be pressing the microphone if we have  
 24 a concern that things might go on too long.  
 25 On your observation of our being responsive to the

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13:15 1 In opening Pakistan's case yesterday, I identified  
 2 what we perceive to be the key issues with which the  
 3 Second Phase is concerned. And as we have reflected on  
 4 them in the light of your questions and overnight,  
 5 I think that we have concluded that that formulation of  
 6 those three elements is accurate and helpful. So I come  
 7 back to them because they also provide, I hope, a little  
 8 bit of discipline for our submissions to come.  
 9 So the three elements, as we perceive them, are:  
 10 first of all, what is the Treaty framework relevant to  
 11 India's determination of installed capacity and  
 12 anticipated load? Second, how does this framework  
 13 operate to inform India's projection of installed  
 14 capacity and anticipated load? And third, once we have  
 15 a Treaty-compliant projection of installed capacity and  
 16 anticipated load, how are these to be taken into account  
 17 for purposes of the calculation of maximum pondage?  
 18 And in identifying and restating these questions,  
 19 we have in mind the discipline -- which is really  
 20 a discipline for us -- that this is not a phase writ  
 21 large on pondage. You've already given very clear  
 22 findings on a number of aspects, and we are not going  
 23 back into those.  
 24 So in the light of the Court's questions of  
 25 yesterday, we've gone back to these elements of the

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13:16 1 enquiry, with a view to focusing these second-round  
 2 submissions to be more closely responsive to the  
 3 questions. And as you will see in due course, our  
 4 revised final submissions -- which are reasonably  
 5 materially revised, but within the scheme of the  
 6 submissions that we advanced in the Memorial -- our  
 7 revised final submissions are also an endeavour to be  
 8 more responsive to these three questions.  
 9 I have now some brief observations on the first of  
 10 these three elements: the Treaty framework relevant to  
 11 the determination of installed capacity and anticipated  
 12 load.  
 13 As a preliminary matter, there are a number of  
 14 propositions that are illuminated perhaps, if you like,  
 15 from the exchanges across the bar of yesterday that  
 16 might usefully framework the enquiry, and perhaps,  
 17 we submit, might usefully assist in your deliberations.  
 18 And these framing propositions I hope will be responsive  
 19 to the enquiries that you raised yesterday.  
 20 The first proposition is that while the enquiry in  
 21 which you are engaged now will necessarily be  
 22 an exercise of inference -- in the sense that this  
 23 exercise is not addressed expressly in the Treaty, so it  
 24 must necessarily be an exercise of inference -- it must  
 25 nonetheless be firmly rooted in the Treaty. In other

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13:20 1 and we have revisited some elements of our final  
 2 submissions precisely to address that.  
 3 You will see in due course that, for example, one of  
 4 the issues that was the subject of exchange,  
 5 Mr Chairman, between you and Mr Rae, that of ramp-up and  
 6 ramp-down time, we have removed, because we are  
 7 attentive to at least what we perceived to be  
 8 a motivation behind some of your questions that we  
 9 should not be engaging in an exercise that is overly and  
 10 unnecessarily prescriptive of India. This needs to be  
 11 a reasonable framework.  
 12 The fourth proposition, building on the third, is  
 13 that the articulation of the applicable framework also  
 14 needs to avoid being overly and unnecessarily  
 15 constraining on India; not simply that we need to avoid  
 16 a detailed, pages-long tick-box exercise, but that  
 17 whatever exercise we come up with needs to avoid being  
 18 overly and unnecessarily constraining on India in the  
 19 sense of only requiring from India what is necessary,  
 20 and not more. We are not here to try to persuade you  
 21 that the exercise in which you are engaged should become  
 22 a straitjacket. We want the Treaty to be workable in  
 23 respect of these elements.  
 24 But that brings me to the fifth proposition, and  
 25 that is that this applicable framework that you are to

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13:18 1 words, you are not required to, indeed you do not have  
 2 competence to, and we are not asking you to engage in  
 3 a legislative exercise. We are only asking you to  
 4 engage in an interpretive exercise. That is your  
 5 mandate, certainly in this phase of the proceedings.  
 6 Subject to this appreciation, proposition number 2  
 7 is that it will nonetheless be important to strive for  
 8 as much certainty and clarity as possible, while  
 9 acknowledging nonetheless that there will necessarily be  
 10 elements of flexibility and appreciation that will have  
 11 to remain.  
 12 So, once again, we are not asking you to put a full  
 13 stop at the end of a sentence if it addresses a point  
 14 that requires India's appreciation in due course. We  
 15 are simply requesting/inviting the Court to give as much  
 16 clarity and certainty to the issues as you are able to  
 17 give, while maintaining the elements of flexibility and  
 18 appreciation that have to be maintained.  
 19 As a third proposition, we consider that  
 20 an articulation of the applicable framework by the Court  
 21 in respect of the projection of installed capacity and  
 22 anticipated load, and how that applies to the  
 23 calculation of maximum pondage, should avoid being  
 24 overly and unnecessarily prescriptive to India, in the  
 25 sense of simply imposing a detailed tick-box exercise,

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13:22 1 articulate in your award in this phase must, though,  
 2 acknowledge the challenges that have arisen historically  
 3 on these issues and that might be anticipated in the  
 4 future, and I will come back to an element of that in  
 5 just a moment.  
 6 So these are the five framing propositions, which  
 7 we hope will leave you with a sense that we are trying  
 8 to assist in coming up with an applicable framework that  
 9 is going to be reasonable and workable, and that will  
 10 not be a straitjacket. This framework should not --  
 11 your award in this phase should not, of itself, become  
 12 a source of future dispute, but should provide  
 13 reasonable, minimalist, but nonetheless complete  
 14 guidance on what is required under the Treaty.  
 15 I don't know whether we have a paragraph 9 -- yes.  
 16 So in my opening submissions yesterday, I took you  
 17 to paragraph 9 and to Appendix II of Annexure D. And if  
 18 we could go to Appendix II (PHM-0001, slide 4).  
 19 As regards the information that India is required to  
 20 communicate in Appendix II, I note that there are three  
 21 items in this list of information that are engaged by  
 22 the present enquiry. It might be said, arguably, that  
 23 there are more, but there are certainly three items that  
 24 are engaged.  
 25 The first one is paragraph 3(b), "Hydraulic Data":

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13:23 1 "Full Pondage Level, Dead Storage Level and Operating  
 2 Pool", and then, "together with the calculations for the  
 3 Operating Pool". So 3(b) provides the rubric, the  
 4 chapeau, which requires India to provide information in  
 5 respect of the calculations for the operating pool.  
 6 We then come to 4(h), and maybe we can just zoom in  
 7 to that side of the page, if that's possible. So 4(h),  
 8 and this is in respect of design. India must also  
 9 provide:  
 10 "Details on the discharge proposed to be passed  
 11 through the Plant initially and ultimately, and expected  
 12 variations in the discharge on account of the daily and  
 13 weekly load fluctuations."  
 14 It's quite clear that that is also relevant to the  
 15 enquiry about installed capacity and anticipated load.  
 16 And then 4(i), India must provide:  
 17 "Maximum aggregate capacity of power units  
 18 (exclusive of standby units) for Firm Power and  
 19 Secondary Power."  
 20 And once again, this relates to installed capacity  
 21 and anticipated load.  
 22 Now, in your General Issues Award -- and this is  
 23 writ through the General Issues Award, but I highlight  
 24 for your attention -- and I don't propose to take you to  
 25 these paragraphs, but I highlight for your attention

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13:26 1 Clarification Decision and in PO17 -- or less PO17, but  
 2 it follows from that -- that you identified a number of  
 3 elements relevant to the enquiry in which you are  
 4 engaged and two key tests concerning the projection of  
 5 installed capacity and anticipated load. The first is  
 6 that that projection must be realistic, well-founded and  
 7 defensible, you heard a lot from us on that yesterday;  
 8 and second, that that projection must correspond to how  
 9 the HEP will actually be operated once constructed, and  
 10 cannot be hypothesised in a manner that serves to  
 11 inflate the maximum pondage.  
 12 For ease of reference -- they're a bit of  
 13 a mouthful -- I will refer to these two tests as simply  
 14 as "the evidence-based tests". So realistic,  
 15 well-founded and defensible; and then actual operation,  
 16 not hypothesised. Those are the evidence-based tests.  
 17 Approaching the Second Phase issues through the  
 18 prism of these two elements of your General Issues  
 19 Award -- and the two elements here now are that of the  
 20 information communication and sufficiency obligations,  
 21 that's one key element, information communication and  
 22 sufficiency obligations; and then the evidence-based  
 23 tests, realistic, well-founded and defensible, and  
 24 actual operation, not hypothesised.  
 25 So approaching the Second Phase issues through

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13:25 1 just two of those paragraphs: it's at paragraphs 682 and  
 2 742 -- you addressed in some detail the issue of the  
 3 scope of the information required to be communicated to  
 4 Pakistan with respect to exactly these items in  
 5 Appendix II, but you stopped short -- no doubt in  
 6 anticipation of this phase to come -- you stopped short  
 7 of elaboration and specificity of detail on precisely  
 8 what information should properly be included. So, in  
 9 a sense, you anticipated the chapeau, but you haven't  
 10 populated the rubric underneath it.  
 11 You also addressed in more general terms the issue  
 12 of the obligation to share information and the  
 13 sufficiency of information shared in paragraph 802 of  
 14 the Award and other aspects of the Award addressing  
 15 information to be shared under Article VII(2) of the  
 16 Treaty: paragraph 9 dealing with the specificity of  
 17 information in respect of design compliance;  
 18 Article VII(2) dealing with information required more  
 19 generally.  
 20 As I say, I don't think it's necessary to take you  
 21 to those paragraphs, but do put them on your transcript  
 22 reference page for the future.  
 23 We noted yesterday from the outset -- I did, and  
 24 then my colleagues, in various forms, followed -- that  
 25 in your General Issues Award, and indeed in the

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13:28 1 the prism of these aspects, we consider that there is  
 2 a clear and firm framework, rooted in the Treaty,  
 3 pursuant to which the Court can and should elaborate to  
 4 provide greater specificity on the information that  
 5 India must properly provide to Pakistan to meet its  
 6 obligations under the Treaty regarding the projection of  
 7 anticipated load and installed capacity.  
 8 You've said it must be defensible, realistic,  
 9 well-founded and actual; you've said that there is  
 10 an obligation to provide information. The obligation to  
 11 provide information provides, we believe, competence for  
 12 you to properly elaborate, under the rubric of those  
 13 three provisions in Appendix II, 3(b), 4(h) and 4(i),  
 14 a more elaborated framework of the information to be  
 15 provided.  
 16 In this context, I come back to the framing  
 17 observations that I made a little earlier: that  
 18 an articulation of the applicable framework by the Court  
 19 should avoid being overly and unnecessarily prescriptive  
 20 to India, should avoid being overly and unnecessarily  
 21 constraining of India, but must acknowledge the  
 22 challenges that have arisen historically on these issues  
 23 and that might be anticipated further.  
 24 Having regard to all of these elements, and being  
 25 attentive to the Court's questions of yesterday, we have

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13:30 1 revised our final submissions to include what we  
 2 consider to be specific but minimal information  
 3 communication obligations on India that would allow  
 4 India, subject to the detail of the information  
 5 provided, to meet its information and evidence-based  
 6 tests relevant to this phase of the proceedings. So in  
 7 other words, if India provides the relevant information,  
 8 and if that information is substantive, then India will  
 9 meet its sufficiency of information and its  
 10 defensibility tests.

11 And I will just identify three elements that we have  
 12 now included, or will be including in our final  
 13 submissions, that we think are essential, but  
 14 nonetheless minimalist and as clear as possible,  
 15 relating to information that India must provide. My  
 16 colleagues will come back to some or all of these in due  
 17 course.

18 The first one is that we consider that India must  
 19 provide a representative weekly load curve for the dry  
 20 season in the Northern Region Grid, based on historical  
 21 load demand data, accompanied by the underlying data.  
 22 So that's the first element: a representative weekly  
 23 load curve for the dry season in the Northern Region  
 24 Grid, based on historical load demand data, accompanied  
 25 by the underlying data.

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13:33 1 that's it. We haven't gone into wider issues regarding  
 2 other detailed information that needs to be taken into  
 3 account. For example, we haven't addressed issues  
 4 concerning length of transmission cables, or ramp-up  
 5 time or ramp-down time. It may be that in the light of  
 6 your reflection on what we've had to say, and the  
 7 questions that you put to our engineering colleagues,  
 8 you will consider that there is more detail that should  
 9 be added. But we think that these three elements are  
 10 the essential elements.

11 Now, there is one last element that I make just to  
 12 underpin this submission, and then I will pass the baton  
 13 to my colleagues, and this goes to the issue of the  
 14 challenges that have arisen historically on these  
 15 issues, and that might be anticipated in the future.  
 16 Because this is not an abstract exercise; this has to be  
 17 an exercise that engages with the historic experience of  
 18 the Parties, and engages in particular with not simply  
 19 India's obligation under paragraph 9 to communicate  
 20 information, but also with Pakistan's right to be able  
 21 to challenge -- or at least examine, and then decide  
 22 whether to challenge -- that information under  
 23 paragraph 10.

24 It's evident from your questions yesterday -- and we  
 25 would have expected nothing less -- that you have looked

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13:31 1 Second, we consider that India should provide  
 2 information on the anticipated future load, including  
 3 any underlying data, if -- and the "if" is important  
 4 here, because we don't think that India needs to provide  
 5 this data if it's not going to rely upon it -- but that  
 6 is if India desires to account for such future load in  
 7 its projection of the anticipated load of the proposed  
 8 Annexure D, Part 3 HEP.

9 And then finally, we consider that India must  
 10 provide a justification for the projection of the  
 11 installed capacity of a proposed Annexure D, Part 3 HEP,  
 12 having regard to the hydrology at the HEP site and the  
 13 anticipated load. And that's just to bring the elements  
 14 of anticipated load and installed capacity together.

15 As you will hear from my colleagues -- and you can  
 16 put this to our engineering colleagues, to Mr Rae and to  
 17 Dr Morris -- we ultimately don't think that the issue of  
 18 installed capacity is going to be hugely influential or  
 19 relevant on the calculation of maximum pondage. But  
 20 the test that you've set out in the General Issues Award  
 21 is that there must be a realistic, well-founded and  
 22 defensible determination of the proposed anticipated  
 23 load and installed capacity, so we need to bring those  
 24 together.

25 Now, those three elements in our final submission,

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13:35 1 very closely at not simply our Memorial, but also very  
 2 closely at the appendices that we submitted. And you  
 3 will know that in Appendix A to our Memorial,  
 4 we provided you with the full details of all of the  
 5 paragraph 9 communications that India has communicated  
 6 to us. A review of this material, we say, will show  
 7 that historically India has been pretty parsimonious in  
 8 the information that it has provided to Pakistan, in  
 9 particular under the three items that are relevant to  
 10 this phase of the enquiry.

11 Now, I don't, in the interest of time, propose to  
 12 take you to this. But if you have a look at the  
 13 information packet under paragraph 9 in respect of the  
 14 Kiru HEP, of which we've got lots of detail and [it] is  
 15 engaged in this phase -- and that's at P-0546  
 16 (resubmitted), and we can use this as a best case  
 17 example for India -- if you have a look at that Kiru HEP  
 18 packet of information, you will see that only a fraction  
 19 of the information contained in this notification  
 20 relates to the items of which we are here concerned.

21 I don't have it in front of me but, from  
 22 recollection, that entire packet of information  
 23 comprises about 61 pages. A very large proportion of  
 24 that information simply includes MMD information. And  
 25 there is very, very parsimonious information relating to

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13:36 1 these three items on the Appendix II agenda: 3(b), 4(h)  
 2 and 4(i).  
 3 As I say, given the time constraints, I don't  
 4 propose to take you to these, but simply to direct your  
 5 attention to the information that is relevant to  
 6 installed and anticipated load in that exhibit.  
 7 You will see at page 5 of this exhibit, at  
 8 paragraph 4(i), information in respect of anticipated  
 9 load; it is just a few words long. On the same page,  
 10 you will see at paragraph 4(h) the information in  
 11 respect of -- I think it's installed capacity; I might  
 12 have those confused. And in respect of the calculation  
 13 of maximum pondage, which is the 3(b) information, you  
 14 will see this at page 3 of that packet of information.  
 15 As you will see from this Kiru HEP paragraph 9  
 16 notification, that's all that Pakistan is given. And if  
 17 you go back to some of the paragraph 9 packets of  
 18 information in respect of some of the other HEPs, you  
 19 will see that in the initial tranche of information that  
 20 is provided to Pakistan, sometimes this information is  
 21 missing altogether, and Pakistan has to go back to India  
 22 to say, "Please provide this further information". And  
 23 there are instances in which it has taken a year or  
 24 two years for that further information to be provided.  
 25 So this information, and the communication of this

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13:40 1 So, Mr Chairman, members of the Court, the Treaty  
 2 framework requires of India more than the information  
 3 that it provides, and if you are to fill out the  
 4 template of the methodology that you have directed is  
 5 the appropriate methodology, we need further guidance on  
 6 that.  
 7 We agree that this should not be a multiple-pages,  
 8 tick-box exercise. We don't want to get  
 9 an American-style disclosure document dump, where we get  
 10 tens of thousands of pages of information and then we  
 11 have to identify the relevance of it. But we do need to  
 12 get basic, core information that allows an assessment of  
 13 the two tests: realistic, well-founded and defensible;  
 14 and actual use, rather than hypothesised.  
 15 So I will stop there. But we, Pakistan, ask you to  
 16 elaborate on and specify what is required to meet the  
 17 tests that you have laid down in your General Issues  
 18 Award.  
 19 Mr Chairman, members of the Court, if there's  
 20 anything that I can help you with, I would certainly be  
 21 happy to try to do so. Otherwise, Mr Chairman, I would  
 22 invite you to ask Mr Rae to the podium to continue the  
 23 submissions, and I hope we have allowed a sufficient  
 24 amount of time for you to cross-examine him at the bar.  
 25 THE CHAIRMAN: Thank you, Sir Daniel. I'm not going to let

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13:38 1 information to Pakistan, we consider to be the absolute  
 2 fulcrum of the proceedings in which you are involved.  
 3 Because if India is to meet its "realistic, defensible,  
 4 and well-founded" test, if we are to be able to  
 5 undertake an evaluation of that, we have to be provided  
 6 with a certain minimum amount of information; and that  
 7 certain minimum amount of information has to be able to  
 8 attest to actual use, not hypothesised use.  
 9 Mr Chairman, I think my colleagues will come back  
 10 perhaps to one of the questions that you put to them  
 11 yesterday -- I forget whether it's Professor Webb or  
 12 Dr Miles -- about: is there any underlying information  
 13 in relation to Pakistan's regular objection that  
 14 the load curve is just hypothesised?  
 15 And one of the challenges that Pakistan has faced is  
 16 that there is a minimal, a bare minimal, parsimonious  
 17 amount of information that India habitually provides,  
 18 and Pakistan therefore, if you like, almost habitually  
 19 says, "This is hypothesised". That response that it is  
 20 hypothesised in a sense is a recognition that there is  
 21 not even anything that Pakistan can grip, because there  
 22 are just bare figures.  
 23 But if I haven't stolen the thunder of my colleagues  
 24 and perhaps stepped on their submissions, they will come  
 25 back to this further.

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13:42 1 you go quite yet, I'm afraid, and Mr Rae will just have  
 2 to pause for a moment.  
 3 So feel free to say these questions will be answered  
 4 in due course, but I just wanted to give you the  
 5 opportunity, while you're standing there, to respond if  
 6 you wish.  
 7 As I understand it, in the revised dispositif that  
 8 you'll be providing to us, there will be a phrase  
 9 "hydrology of the [hydroelectric plant] site" that  
 10 appeared in the original dispositif at paragraph (2)(d).  
 11 And the reason I raise this, the hydrology of the HEP  
 12 site, is that there's a certain logical progression in  
 13 your original dispositif that attempts to explain what  
 14 various things are, but that particular phrase,  
 15 "hydrology of the HEP site", wasn't being further  
 16 explained.  
 17 Now, perhaps the intention is to simply refer to the  
 18 MMD. Perhaps the intention is to do something broader  
 19 than that; the issue of sedimentation comes to mind.  
 20 But I would welcome greater clarity at some point in  
 21 your submissions about what that particular term means,  
 22 particularly if it's going to be replicated in  
 23 the revised dispositif.  
 24 SIR DANIEL: Thank you, Mr Chairman. I'm not sure that  
 25 I will give you a fulsome answer now, and we will

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13:43 1 reflect on it further.  
 2 That reference to hydrology of the site is really  
 3 a reference to the issues that we raised also in our  
 4 Request for Clarification that anticipated load and  
 5 installed capacity cannot be detached from the source of  
 6 energy, the water in the river. And one of the concerns  
 7 that we expressed in our original methodology in  
 8 relation to India's approach regarding anticipated load  
 9 and installed capacity is that it could be entirely  
 10 detached from the river, from the hydrology of the site,  
 11 and that were India to choose -- which no doubt it  
 12 wouldn't simply for commercial reasons -- but to choose  
 13 to design and propose a site, a multiple-gigawatt site,  
 14 on a river that could not sustain it, this would not be  
 15 realistic, defensible and well-founded.  
 16 So I think that the reference to hydrology was  
 17 simply to tie the exercise of projecting installed  
 18 capacity and anticipated load to the river, to the flow  
 19 of water. But we will reflect further on whether we  
 20 ought to try and make that a little bit more granular.  
 21 THE CHAIRMAN: Well, do reflect on it, because that sounds  
 22 like potential for sedimentation accumulation is not to  
 23 be included in the calculation of the pondage needed,  
 24 and whether that's appropriate or not, the Court would  
 25 in due course need to consider. But I just wanted to

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13:47 1 overall capacity.  
 2 And therefore, while I can see a factor that says:  
 3 in calculating pondage, one might think about what  
 4 capacity is needed in the dry season, I'm wondering  
 5 a bit how that relates to the fact that you might need  
 6 a much higher capacity in the wet season, and would  
 7 invite Pakistan, in the course of today's submissions,  
 8 to perhaps touch on that point as well.  
 9 SIR DANIEL: Mr Chairman, I expect that you will get chapter  
 10 and verse on this from Mr Rae and from Dr Morris, so  
 11 I'm certainly not going to tread on their toes.  
 12 THE CHAIRMAN: That's fine.  
 13 One observation is that you pointed us to Treaty  
 14 provisions in Appendix II, which I think is quite  
 15 correct. I myself am also fixated on the idea that we  
 16 are, at the end of the day, interpreting paragraph 8(c)  
 17 of Annexure D, which refers to "Firm Power". And  
 18 it seems to me part of the conversation that might be  
 19 valuable this afternoon turns on what might be meant by  
 20 "Firm Power": is that limited to a particular approach  
 21 that would be interested in just the operation of the  
 22 plant on a regular weekly basis, or is it also focused  
 23 on broader demands that might exist over time with  
 24 respect to a grid system?  
 25 I think you are addressing that in what you just

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13:45 1 understand what Pakistan's approach would be in that  
 2 regard.  
 3 SIR DANIEL: Thank you, Mr Chairman.  
 4 Perhaps just in response to that, before you move to  
 5 your next question, I do recall that in the General  
 6 Issues Award, the Court made it very clear that amongst  
 7 India's obligations was an obligation in choice of  
 8 the site, and the very choice of the site had to be  
 9 Treaty-compliant, and that would of course bring in  
 10 issues of whether sedimentation management techniques  
 11 would be available, so no drawdown flushing and so on.  
 12 But as I say, we will reflect further on that point.  
 13 THE CHAIRMAN: A different issue is that in the original  
 14 dispositif, there seemed to be -- and here I have in  
 15 mind -- what you indicated was paragraph (2)(f), that  
 16 the dry season was going to be relevant when determining  
 17 installed capacity.  
 18 As you read your description of what might come with  
 19 the new dispositif, it sounded like you might have  
 20 changed that, in which case this is fine. But I did  
 21 have in the back of my mind, when one is thinking about  
 22 the installed capacity of the hydroelectric plant,  
 23 presumably a hydro engineer is interested in harnessing  
 24 the power of the river during the wet season, and that  
 25 this would be an important component in determining your

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13:49 1 said to us: that, in your view, India can present  
 2 information about the power demand needs it may have,  
 3 and as long as they can justify it then it's all fine.  
 4 But to me, in some respects, that concept of "Firm  
 5 Power", and when is that firm power needed, and for what  
 6 purposes, is also perhaps part of what we are trying to  
 7 sort through here.  
 8 SIR DANIEL: Thank you, Mr Chairman. I'm going to resist  
 9 making any observations on that, both in anticipation of  
 10 what my engineering colleagues will have to say and what  
 11 Dr Miles and Professor Webb will have to say.  
 12 I think in the light of the exchanges across the bar  
 13 yesterday, we came away with a very clear  
 14 appreciation -- and it was a very salutary appreciation  
 15 because it's not an appreciation that we would resist,  
 16 but you helpfully put your finger on it -- that the  
 17 Court appears to be inclined -- and I'm not reading into  
 18 your, as it were, deliberation room any specific  
 19 inclination -- but the Court appears to be disinclined  
 20 to try and look too deeply into the future to tie  
 21 India's hands. And we accept and acknowledge that that  
 22 must be the case.  
 23 Where we are concerned is not with the process of  
 24 Pakistan engaging with India if they come to us and say,  
 25 "We have undertaken a rigorous exercise of trying to

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13:50 1 project what the world might look like in 10 years' time  
 2 or in 15 years' time. This is the way that we are  
 3 designing the plant, this is our anticipated load, this  
 4 is the installed capacity to deal with the anticipated  
 5 load". I mean, in such circumstances, as a very first  
 6 reaction, we would say: well, subject to looking at the  
 7 detail, at least there appears to be a reasoned  
 8 engagement, what I termed an "evidence-based  
 9 engagement", and that will go some way towards meeting  
 10 the requirements.  
 11 So a sufficiency of information on a timely basis  
 12 that deals with these items we think would go a very  
 13 long way to dealing with the requirements of "realistic,  
 14 defensible, and well-founded", and actual operation,  
 15 rather than simply a number in the air. It may be that  
 16 we are doing our friends and colleagues from India  
 17 a disservice, but it sometimes feels, when one looks at  
 18 this documentation, that there is a finger in the air:  
 19 here is a number.  
 20 And with the concerns over weaponisation, which  
 21 I don't want to revisit, perhaps we, on our side of the  
 22 room, may be a little bit at risk of looking with too  
 23 much hostility at the information that is provided. But  
 24 we are not given anything further.  
 25 I make the observation also just to -- perhaps I'm

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13:52 1 here going to tread on Dr Miles's submissions. I make  
 2 the observation that we do not come to the bar here to  
 3 make a point about weaponisation in respect of the  
 4 quantum of water in the pondage pools as regards this  
 5 phase of the proceedings. We have made those  
 6 submissions, you have heard them, you have addressed  
 7 them in the General Issues Award.  
 8 I do, though, revisit one aspect of our observations  
 9 in the General Issues Award, and that is that the 200  
 10 HEPs, either actual or planned, on the Western Rivers  
 11 are a very, very small proportion of the 5,000 or so  
 12 HEPs that India either has or is planning across the  
 13 whole of the country. And I think the observation that  
 14 I made from the podium in the hearing on the first  
 15 session was that our appreciation is that there is  
 16 a real risk that what India is simply doing is it's  
 17 taking its national template and simply applying it to  
 18 the Western Rivers, rather than adjusting its national  
 19 template to take account of the Treaty strictures.  
 20 The Treaty strictures are there. They are akin to  
 21 a border treaty or a peace treaty, as we put it. We  
 22 need information to be able to engage in good faith with  
 23 India across the table. We do not get that information.  
 24 This phase of the case provides the Court with  
 25 an opportunity to say to India: here is the bare

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13:54 1 sufficiency of information that must be provided.  
 2 THE CHAIRMAN: Thank you very much for that.  
 3 I'll let you go with just one more question of,  
 4 I suppose, an evidentiary nature.  
 5 The Court has not yet brought into the record the  
 6 logbooks that Pakistan would like to introduce into the  
 7 record, and that's a process that will unfold in due  
 8 course. But in anticipation of the possibility of that  
 9 information coming in, I wanted to ask -- and it seemed  
 10 like you might be the most likely person to answer the  
 11 question -- whether Pakistan has in its possession  
 12 information like that for any other Indian HEPs on the  
 13 Western Rivers that can also be submitted into our  
 14 record. Separate from the Neutral Expert's proceedings;  
 15 I'm not trying to stray into that. But just trying to  
 16 confirm: does Pakistan have similar logbooks that might  
 17 have been produced in other circumstances?  
 18 SIR DANIEL: I'm looking at Pakistan's Commissioner, and  
 19 he confirms by the shake of a head that we don't.  
 20 We have analysed the information on the use of the  
 21 operating pool that we have, and that relates to  
 22 Kishenganga and to Baglihar, but not to anything more.  
 23 THE CHAIRMAN: In which case, final question, connecting to  
 24 something I mentioned yesterday, but perhaps not  
 25 robustly.

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13:56 1 To the extent that Pakistan ultimately is asking the  
 2 Court to draw some conclusions from the way a plant was  
 3 initially designed and the way in fact it was later  
 4 operated, it seems like there might be relevance in  
 5 looking at the way Pakistan's hydroelectric plants on  
 6 the Western Rivers were originally designed and were  
 7 thereafter operated. So the question would be whether  
 8 that's information in Pakistan's possession that could  
 9 readily be made available if the Court saw a need to  
 10 look at it; and I suppose, further, whether that might  
 11 be relevant to the Court's consideration of the issue as  
 12 Pakistan is going to put it to us.  
 13 SIR DANIEL: Mr Chairman, let me respond to that, and I do  
 14 so knowing that Dr Miles was going to come to this  
 15 issue. But as you put the question to me, let me  
 16 respond to it, and he can correct me if needs be.  
 17 The short answer is that we don't have that  
 18 information immediately to hand in this room. We could  
 19 go through a process, if you thought that such  
 20 information was necessary and relevant, to collate that  
 21 information. That information is not information that  
 22 is within the computer system and the desk drawer of  
 23 Pakistan's Commissioner; it rests with other parts of  
 24 the Government of Pakistan.  
 25 I note immediately though that there is, I think,

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13:57 1 a very material question as to whether it is relevant at  
 2 all. And in doing so, I recall your procedural order on  
 3 the site visit to the Neelum-Jhelum plant, where you  
 4 wrote into the preambular paragraphs very clearly that  
 5 the Court was mindful that the Neelum-Jhelum plant was  
 6 not an Annexure D plant, and therefore, in terms of the  
 7 design constraints in respect of the pondage pool or any  
 8 other aspects, or the operational constraints, that that  
 9 plant and, by extension, all of [Pakistan's] plants are  
 10 not subject to Annexure D design and operational  
 11 constraints.  
 12 So there is an initial question that you will need  
 13 to consider as to whether that information would and  
 14 could at all be useful to you, apart from, if you like,  
 15 an educational exercise to see how Pakistan is operating  
 16 its plants outside of the Treaty framework.  
 17 If you think for any reason that that information  
 18 would be useful to you, then we would go about  
 19 collecting it. It's not going to be a straightforward  
 20 exercise; we're not going to be able to say we can give  
 21 you that information in a day or a week or whatever.  
 22 We would have to undertake an exercise there.  
 23 But as I stand here in response to your question,  
 24 I'm not sure that it's going to be illuminating for you  
 25 in addressing the design and operational elements of

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14:01 1 But yesterday I bombarded you with a lot of details  
 2 that, in all honesty, leave some uncertainty remaining  
 3 as to how pondage would be computed. So I'd like to  
 4 take a few moments today to try to draw together some of  
 5 the threads of my presentation yesterday by way of  
 6 a short summary. And I hope this can be a way to add  
 7 some substance to the meaning that we're trying to get  
 8 out of "realistic, well-founded, and defensible" in the  
 9 computation of the pondage.  
 10 So firstly, the inputs --  
 11 THE CHAIRMAN: I'm sorry, Mr Rae, can I pause you for just  
 12 a moment to confirm that we don't have your slides in  
 13 front of us; is that correct? Okay, very good. I have  
 14 some slides for Dr Miles, I believe, but not you, and  
 15 I'd like to look at mine and annotate them while you're  
 16 talking.  
 17 So I apologise for the interruption. Please proceed  
 18 when you're ready.  
 19 MR RAE: Okay.  
 20 (Slide 2) Well, the inputs are here, and they're  
 21 relatively sparse in terms of what's actually required.  
 22 The first, of course, is the minimum mean discharge,  
 23 which is based on the hydrology of the river.  
 24 Then plant characteristics themselves, being  
 25 capacity, rated discharge, minimum discharge head and,

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13:59 1 the enquiry that you're engaged with.  
 2 THE CHAIRMAN: Well, thank you. That's very helpful and  
 3 I don't think we need to belabour it.  
 4 You may want to reflect a little bit on it, in terms  
 5 of: if the logbooks come into the record that you're  
 6 hoping will come into it, and if you are hoping to  
 7 assert particular propositions about those logbooks that  
 8 you think should be relevant to the Court's  
 9 consideration of the Second-Phase issues, at least in  
 10 the back of my mind is the general question of the ease  
 11 with which, when designing a run-of-river HEP on rivers  
 12 that have lots of sedimentation, for example, how easy  
 13 it is to anticipate how we will be operating in, say,  
 14 five years or ten years or fifteen years.  
 15 So it's just my own thought, and I don't press you  
 16 any further on it.  
 17 But I thank you for your observations, Sir Daniel.  
 18 You had predicted 25 minutes; I fear that we've kept you  
 19 for an hour, so we're already now a little bit behind  
 20 time, but I think it's been time well spent. So thank  
 21 you very much.  
 22 SIR DANIEL: Thank you very much.  
 23 THE CHAIRMAN: Mr Rae, you're welcome to come to the podium.  
 24 MR RAE: (Slide 1) Thank you. Good afternoon. I'll be as  
 25 brief as possible, to see what we can do with time.

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14:02 1 if necessary, an e-flow. And all of these  
 2 characteristics are left to the full discretion of  
 3 India. The optimisation of the capacity is a function  
 4 of the hydrology of the river, but again, it's something  
 5 which India can do, based on their economical analysis.  
 6 But the only other input that's very important is  
 7 the load of the plant, which is what's referred to in  
 8 the Treaty and has also been identified in the General  
 9 Issues Award.  
 10 (Slide 3) So going on, I pointed out that the  
 11 analysis to calculate the pondage can be reduced to  
 12 a few numerical steps, and that's this formulation here.  
 13 If you would refer back to what we submitted, the  
 14 Memorial that we discussed in 2024, it's exactly the  
 15 same formula, with the exception that the inflow has  
 16 been made a fixed parameter rather than a variable  
 17 parameter as in 2024, and what we had as the firm power,  
 18 which appears in the bottom there, Qp, has now been made  
 19 a variable parameter, which is the peaking discharge  
 20 during the peak period. Other than that, the formula is  
 21 the same as what you'll see in the original Memorial or  
 22 in the Memorial submitted in Appendix D.  
 23 However, it's important then to understand the  
 24 parameters. And we have, in addition to this, the very  
 25 simple relationships between power, energy and time. So

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14:04 1 whatever amount of volume you have in a day, you can  
 2 release it in 24 hours at one flow rate or 12 hours at  
 3 a higher flow rate twice that amount. And those two, if  
 4 you change one parameter, the other is changed with it.  
 5 So whatever amount of energy we have, we can release it  
 6 at a power times the time. So the three parameters work  
 7 together, with no flexibility among them. So that's  
 8 a simple relationship and we have that formulation.  
 9 In my remarks yesterday, I referred to variables  
 10 that are not fully defined in the Treaty, and that is  
 11 that the methodology does not lead to an explicit answer  
 12 without making some assumptions. And that's for the  
 13 methodology we are presenting now. The methodology  
 14 we presented in 2024 had a unique answer, but we're  
 15 beyond that now. So we have an uncertain outcome  
 16 because there's a variable which is undefined.  
 17 But if we know the daily energy, we know the plant  
 18 can be loaded for a selected duration, that gives us the  
 19 capacity that the power can be delivered at. And either  
 20 the duration or the capacity is unknown to us at this  
 21 point in time, but if we select one, then the other one  
 22 is fixed. So we have one variable, at most, which is  
 23 unknown in this calculation.  
 24 The key for the calculation is to select  
 25 a reasonable and practical range for the missing

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14:07 1 to be 16 or 18 hours, or something in that range.  
 2 We also believe the peaking capacity should be  
 3 limited in the dry season for the need for maintenance  
 4 and a rational plant loading during the dry season,  
 5 meaning your objective should be to be close to your  
 6 best efficiency or at a more optimum point for  
 7 operation.  
 8 From those two things, a duration or a capacity,  
 9 you can then determine the -- for the given amount of  
 10 energy, we then determine either the time or the  
 11 capacity. We determine one from the other. That gives  
 12 us an hourly load pattern, and from that an hourly  
 13 discharge pattern, simply by converting megawatts to  
 14 cubic metres per second.  
 15 We then compute a straightforward mass curve, which  
 16 is the same process that both Parties have done. India  
 17 also uses mass curves to generate pondage. So there's  
 18 nothing in dispute in that at all.  
 19 And that's the crux -- or that's the whole of the  
 20 process right there. And in that, we have a known load,  
 21 [which] gives us an energy. We have to make  
 22 an assumption either of duration or capacity on the day,  
 23 and from that we get an hourly discharge pattern, which  
 24 gives us the pondage. It's as simple as that.  
 25 The installed capacity likely means that the

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14:05 1 variable, and that leads us explicitly to what is the  
 2 amount of pondage.  
 3 (Slide 4) We have a number of calculation steps,  
 4 which are actually quite straightforward.  
 5 Firstly, we have to have the load of the plant. And  
 6 in our view, this has to be based on the actual load of  
 7 the power system, what we're trying to achieve from week  
 8 to week and deliver.  
 9 We adjust that load to match the firm power, so that  
 10 the load of the plant gives the firm power over that  
 11 week. And from that, we have directly what the energy  
 12 is on the each day within the week.  
 13 The peaking duration we then superimpose on that.  
 14 But it's fairly easily done, because if we have  
 15 an amount of energy on any given day, we then can decide  
 16 the duration that that energy is released in, which then  
 17 gives us the capacity that we can operate at. So from  
 18 the energy, we select the number of hours of generation,  
 19 we get a capacity; or we select the capacity and get  
 20 a number of hours, one or the other.  
 21 In our view, the reasonable number is that peaking  
 22 should be 4 to 6 hours, but it will have a maximum limit  
 23 that it can't go beyond what's given by the minimum  
 24 capacity of the turbine. So you can't go less than  
 25 a certain discharge of the turbine, which will come out

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14:08 1 capacity will generally not govern the result. But  
 2 reason should prevail regardless in looking at the  
 3 effect of installed capacity by making sure that we have  
 4 realistic capacity in the plant.  
 5 This is, as I said, the core of the decision, and  
 6 any other information is detail really that can be based  
 7 on evidence available from the power system and the  
 8 plant design. There is some flexibility in the design  
 9 because a decision must be made for the daily generation  
 10 duration, and that's the main unknown at this point in  
 11 time. But provided that this is a reasonable value, as  
 12 evidenced by the actual load of the system, then the  
 13 pondage resulting from that will be reasonable.  
 14 So we're not leaving you a lot of variables to deal  
 15 with here. Most of it is fixed by the analysis, which  
 16 I believe is beyond dispute of anyone, on how you --  
 17 you know, 2 times 3 equals 1 times 6. It's as simple as  
 18 that, in some of these things.  
 19 So if you go on to the next one (slide 5), the  
 20 result is of course what's summarised here. And  
 21 I showed you and explained this curve yesterday. But of  
 22 course we have one line in blue, which is showing the  
 23 amount of pondage as a function of the daily peaking  
 24 capacity; and the other line, in orange, giving the  
 25 number of hours of generation associated with that

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14:10 1 peaking capacity.  
 2 So if you have a 300-cubic-metre-per-second peaking  
 3 capacity, it requires a pondage of 3.5 million  
 4 cubic metres and it will operate for four hours.  
 5 So in doing an interpretation, the reasonableness  
 6 test for us is to say: if I look at that right axis,  
 7 what is a reasonable range of peaking time or generation  
 8 time on a day that could be conceived? If we select  
 9 what that reasonable range is, work through the path on  
 10 the other axis, you see the range of pondage that arises  
 11 from that. So one relates to the other. And that  
 12 indicates -- that right axis is our unknown variable, or  
 13 the bottom axis is the unknown variable; only one or the  
 14 other.  
 15 So when we talked yesterday about operating best  
 16 efficiency, maintenance and all of that stuff, what that  
 17 is doing is saying: you can't be at the installed  
 18 capacity, which is the right end of the curves, but  
 19 you'll be somewhere lower down on the curves; meaning  
 20 instead of being at 600, you may be at 300 or 400,  
 21 depending on what assumptions you make, which implies  
 22 a certain operating time and pondage.  
 23 So that's one limit. And the other limit is what's  
 24 a reasonable time.  
 25 (Slide 6) Going on, if you apply that, you get

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14:13 1 This is the limit of information I've extracted.  
 2 Baglihar was originally built with 450 MW. It was  
 3 subsequently expanded to 900 MW, so that the rated  
 4 discharge now is about 860 cubic metres per second. The  
 5 minimum mean discharge was 125.68, and there were six  
 6 turbines.  
 7 The minimum mean discharge and its associated firm  
 8 power of about 131.5 MW, they didn't change when you did  
 9 the expansion. So it was just an increase of capacity.  
 10 And that illustrates that firm is the same, but you add  
 11 capacity, which was an expansion of the plant for  
 12 flexibility and operation.  
 13 (Slide 8) So inserting these parameters in the  
 14 spreadsheet that I mentioned yesterday, we get the  
 15 result that's shown here. And the sawtooth line is how  
 16 the pondage would work through the week. And this is  
 17 again for a period of six hours. It fluctuates,  
 18 reaching a peak value in the week of 8.6 million  
 19 cubic metres, which is 2,384 cubic metres per second  
 20 hours on this plot. So the left axis is in cubic metres  
 21 per second hours, but it's easily converted to million  
 22 cubic metres.  
 23 The dashed lines at the top and the bottom: the one  
 24 at the top is equivalent to the value of 37.5 million  
 25 cubic metres that was awarded by the Baglihar Neutral

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14:12 1 a weekly variability of pondage. And everything I'm  
 2 showing here is for the case of the Kiru project, just  
 3 for convenience's sake. And this was done with  
 4 six hours of daily generation. And you'll see the  
 5 pondage goes up and down.  
 6 And around where it says -- close to hours 72 and  
 7 96, you'll notice it doesn't reach zero, and that's  
 8 because in those days it's managed to accumulate some  
 9 energy. And the low-flow day or the low-demand day on  
 10 the Sunday, which is then used in the subsequent days  
 11 for an increase in the amount of generation.  
 12 So the weekly load affects the pondage calculation.  
 13 And at the lower right of the diagram, you see what the  
 14 discharge would look like in that period, with the  
 15 horizontal line being the minimum mean discharge  
 16 through it.  
 17 So it extends to a weekly analysis, and just by  
 18 balancing those two.  
 19 (Slide 7) So by way of an example, I'd like to  
 20 summarise the meaning of all this, but going to the  
 21 Baglihar example. And you did mention Baglihar  
 22 yesterday in some questions. So what I've done is  
 23 extracted the characteristics from the determination and  
 24 taken the load of the power system that I presented to  
 25 you yesterday, identified from the data in India.

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14:15 1 Expert as the amount of pondage, which was also largely  
 2 the amount that India claimed as their requirement.  
 3 The lower line, the orange dashed line at the  
 4 bottom, is the amount originally claimed by Pakistan as  
 5 part of the Baglihar dispute, which was 6.2 million  
 6 cubic metres. And you can see when we apply the  
 7 methodology that I presented to you today, or yesterday  
 8 and today, you come up with about 17.2 as the maximum  
 9 pondage. 17.2 is of course the value after it's been  
 10 doubled, according to paragraph 8(c).  
 11 These are the figures -- the upper and lower ones  
 12 are the figures I take from the determination. And  
 13 there were various discussions on pondage that went on  
 14 for a period of time during that dispute, but it ended  
 15 up with these numbers.  
 16 If I go on to the next one (slide 9), keep in mind  
 17 that we still have this untethered variable, which is  
 18 the peaking duration on a day: how many hours of  
 19 generation do you get? And if I use the same data and  
 20 I vary the daily peaking hours, I get this blue line,  
 21 which shows that if the peaking duration is reduced on  
 22 a day, the pondage increases. So in a case of 4 hours,  
 23 you get 19-point-something; and if you go to 12 hours,  
 24 it comes out to 12 or thereabouts. And again, the  
 25 orange dashed lines at the top and the bottom are the

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14:16 1 range that was presented by the Parties in the Baglihar  
 2 dispute.  
 3 Now, of course this result is based on the actual  
 4 load curve that we have shown here. And yesterday  
 5 I illustrated that the load curve at the time of  
 6 Baglihar, from the single day that they had, would give  
 7 largely the same result. So you would see more or less  
 8 the same result in that case, if I were to imply that.  
 9 So by way of summarising it, the pondage calculation  
 10 is fairly simple. We've got a load curve, and that's  
 11 the important input; characteristics of the plant; and  
 12 then we have to recognise duration of generation on the  
 13 day or the capacity on the day. If we get a reasonable  
 14 value within that, we get reasonable values of pondage,  
 15 which is something which gives flexibility for  
 16 operation.  
 17 The other aspect that was alluded to by some of the  
 18 questions yesterday was whether we can have certainty  
 19 about projections of load to be able to have that  
 20 a useful parameter for the input.  
 21 (Slide 10) So as a way of looking at that, in our  
 22 submission, the Memorial for this phase, we had  
 23 presented this in Appendix D, starting at paragraph 30,  
 24 where we extracted load duration curves for the Northern  
 25 Region Grid for the years 2017 through 2025, which are

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14:20 1 vary a little bit, but it's shown by the value at the  
 2 right axis where it reaches the 100%.  
 3 The third parameter of interest is the gradient of  
 4 the curve, the slope of the middle part, say from about  
 5 10% to 90%. And that slope defines how a project,  
 6 especially an intermediate-load plant or a run-of-river  
 7 plant, how that would be used is defined more or less by  
 8 the slope of that curve, because that's telling us the  
 9 number of hours and the rate of change over time in  
 10 the load curve.  
 11 (Slide 11) So I've examined these things, just as  
 12 a way of trying to screen this, to give some certainty.  
 13 And what we've done -- and I did simply a bit of  
 14 a screening here. And the figure on the left is if  
 15 I take the baseload values, which is simply the value of  
 16 the 100% axis, and look how it varied through the years.  
 17 And the first two years are a little bit different,  
 18 but all of the rest of them fall around the same level.  
 19 There's some variability, and we expect variability;  
 20 there is always some uncertainty in this kind of data.  
 21 It varies about that level.  
 22 The other element I looked at was the slope, the  
 23 gradient at the middle part of the curve. And that's  
 24 what's plotted on the approximate figure on the  
 25 right-hand side, which shows that the gradient, again,

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14:18 1 what is plotted here, along with an averaged curve,  
 2 which is a red one through the middle of it.  
 3 We use load duration curves as a way of predicting  
 4 our load duration going forward. And all the duration  
 5 curve is is that we take the sequential hourly data that  
 6 I used in load curve yesterday and we reorganise it. So  
 7 instead of it being sequential, we take the percentage  
 8 of time that it exceeds every load level, and you get  
 9 this duration curve. So it's a conversion of one to the  
 10 other. And you can convert back from this to the load  
 11 curve by taking the load duration curve back into  
 12 the load curve, by adjusting its pattern.  
 13 What's of interest for planning is whether these  
 14 things remain the same with time. And the goal here, or  
 15 the thing we look at here, is that range for peaking,  
 16 which in this version of a load duration curve, the  
 17 peaking part is normally where the curve has an abrupt  
 18 turn or curve up the left axis. So you notice from  
 19 about 90% to 100%, it curves up. It's not very distinct  
 20 here because there's not a very distinct peak in this  
 21 system. But anyways, that part of the curve is more or  
 22 less the same for all of the different load duration  
 23 curves.  
 24 (Slide 10) The other point of interest is the  
 25 baseload, how much baseload is available. And that does

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14:22 1 stayed more or less the same; it wasn't displaying any  
 2 trend. Now, it's not a long period, it's only 2017 to  
 3 now, so it's eight or nine years, but it's not  
 4 displaying a trend at that level.  
 5 These two things together are telling us that the  
 6 information can be used as a predictor of the future;  
 7 the shape of the curve, that is.  
 8 When you do generation planning, you're looking at  
 9 not only the shape of the load curves but you're also  
 10 looking at the absolute growth of the system. So your  
 11 system is going to grow from whatever it is, 100,000 MW  
 12 to 120,000, over some period of years. The load curve  
 13 will stay more or less the same, or evolve a little bit  
 14 as that load increases.  
 15 But what we're seeing here, in the short term at  
 16 least, is the load curve is quite predictable, meaning  
 17 that the daily load curve is also going to be something  
 18 predictable for us. And since we're always factoring  
 19 this to match the firm power anyways, our view is that  
 20 this is a robust method of coming up with a daily load  
 21 variation for the power system.  
 22 This is leading us then to an input which is based  
 23 on data. It's an absolute value, rather than being  
 24 hypothetical or a conjecture on the part of somebody as  
 25 to how the plant might work. We want to base the plant

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14:23 1 on how it actually is and how it's serving the system,  
 2 which is expressed on these curves. And again, as  
 3 I mentioned, there's always going to be some variability  
 4 in this kind of information, but the results indicate  
 5 that projections can be made reasonably for the power  
 6 system load curve and we can project this usefully for  
 7 the design of these plants.  
 8 (Slide 12) So by way of conclusion to the remarks,  
 9 I'd like to make several observations.  
 10 One is that the pondage can be computed analytically  
 11 from the minimum mean discharge and characteristics of  
 12 the plant. We've set out -- that's a relatively simply  
 13 formulation, there's not a lot of complexity to it.  
 14 The power system load provides the weekly variation  
 15 of the load, and therefore the distribution of the  
 16 volume of water available with the MMD during the week.  
 17 The daily dispatch pattern can be made according to  
 18 reasonable limits for the duration of operation or  
 19 the maximum capacity available on a given day. And  
 20 the daily duration is not available from the Treaty, but  
 21 it must therefore be based on some reasonable dispatch  
 22 plan for the system, or for the plant within the system.  
 23 The capacity resulting from the daily operation must  
 24 also depend on the energy allocated for each day and  
 25 the duration of the operation. So again, the two are

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14:26 1 I've got two questions, which kind of straddle what  
 2 you mentioned today and also partly go back to your  
 3 presentation from yesterday. I hope that's okay.  
 4 I certainly welcome the opportunity to discuss further.  
 5 I think the first question relates to the system  
 6 load. You presented yesterday, and they were also in  
 7 some of your slides today, what I think you referred to  
 8 as a representative weekly variation of the demand in  
 9 the Northern Grid.  
 10 Now, given that we're talking here about  
 11 calculations of firm power, which is intimately related  
 12 to this idea of a short availability, I could imagine  
 13 that India makes the case that rather than looking at  
 14 a representative or random weekly variation, they should  
 15 rather look at a critical period where that variation is  
 16 high, higher than usual, because a short availability  
 17 means that a plant needs to be able to account for that  
 18 variation.  
 19 Would you consider that a reasonable approach, or  
 20 would you say that we just have to look at a typical or  
 21 an average or a representative weekly variation?  
 22 MR RAE: This is an approach I had considered actually, and  
 23 the idea then is whether you want to compute the load  
 24 variation or the load curve for the specific period when  
 25 the minimum mean discharge is calculated. And you can

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14:25 1 intricately related.  
 2 The pondage required for the week depends on the  
 3 variation of the energy through the week and the daily  
 4 dispatch pattern for that. And if we retain reasonable  
 5 values for that generating duration and the associated  
 6 capacity, the resulting pondage will be a reasonable  
 7 value.  
 8 With respect to the load of the power system or the  
 9 load of the plant, Dr Miles will deal with this from the  
 10 interpretation in the Treaty. But from an engineering  
 11 standpoint, the load of the plant should be just that:  
 12 it should be the actual projection of the load based on  
 13 the demand. It should not be a hypothetical load or  
 14 a load that is modified to achieve some other objective  
 15 which is beyond the scope of what's in the Treaty.  
 16 So that's the remarks I had prepared today --  
 17 THE CHAIRMAN: Thank you very much, Mr Rae. We do have  
 18 questions for you. I'm going to start with  
 19 Professor Buytaert.  
 20 Can I just caution you to wait until you hear the  
 21 entire question before you proceed with your answer,  
 22 otherwise we will not capture your answer on the  
 23 transcript.  
 24 PROFESSOR BUYTAERT: Thank you, Mr Chairman. Thank you very  
 25 much, Mr Rae, for these further clarifications.

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14:28 1 go through the hydrological analysis and extract the  
 2 exact ten-day period where you generated the minimum  
 3 mean discharge, and that would give you a corresponding  
 4 date which you could extract from the load curve.  
 5 Now, the difficulty with that is: those two things  
 6 do not have a natural correlation. One is based on  
 7 hydrology of the river, which is very much  
 8 site-specific. The other one is an aggregate load in  
 9 a power system which integrates load across a large  
 10 number of river basins where the hydrological conditions  
 11 may not be fully correlated.  
 12 So to me it seemed like the more practical approach  
 13 was, in the same way that you create an averaging  
 14 process to come to the minimum mean discharge, you  
 15 should go through an averaging process to generate  
 16 the load curve. And subject to the constraint that that  
 17 load curve should be for the dry-season months, when  
 18 we expect the greatest use of the pondage, which is what  
 19 I alluded to yesterday: that we expect the period of the  
 20 year where the daily amplitude of load is greatest, and  
 21 therefore you're going to have the greatest use of load.  
 22 So it's an issue of a large system that is not well  
 23 correlated to a local hydrological condition which is  
 24 leading to the minimum mean discharge.  
 25 PROFESSOR BUYTAERT: Thank you.

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14:30 1 I think you rightly point out a lack of correlation.  
 2 But you can take that argument further and say: well,  
 3 that means that in the future you might have the  
 4 possibility or a risk that the period of minimum mean  
 5 discharge coincides with a period of higher demand  
 6 variability than anything that you've observed in the  
 7 past.  
 8 MR RAE: But we are -- well, minimum mean discharge is  
 9 a fixed parameter: it is defined at the beginning and  
 10 then it's not something which changes.  
 11 The load that we have, whether they want to look or  
 12 one year or two years or three years -- you can look at  
 13 however many years of loads you want. It would be  
 14 important in doing that though to normalise them all, so  
 15 they have a common average, rather than using the  
 16 absolute values.  
 17 But the idea that you will somehow find a period  
 18 which is more severe, that's not necessarily the best  
 19 information to use, because you could always go through  
 20 and cherry-pick results and find the one that might be  
 21 worse than the others, but you don't know if that result  
 22 is due to some abnormal condition that affected the load  
 23 system. Maybe there was a massive outage or something  
 24 that created a large outage on one day or two days,  
 25 which would imply a very high level of pondage required.

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14:31 1 Well, in truth, that's not a normal operation of  
 2 the system.  
 3 When we come to the pondage, whatever we compute,  
 4 we are then going through a process of doubling that.  
 5 And that doubling process is establishing a safety  
 6 factor for the amount of pondage, which covers for  
 7 variability in the load, covers for variability in the  
 8 load demand, it covers for variability in the operation  
 9 of the power station and it covers for changes in the  
 10 river system, such as, for example, the accumulation of  
 11 sediment. This is something which is covered within  
 12 that doubling or that safety factor that's provided for  
 13 in the Treaty already.  
 14 PROFESSOR BUYTAERT: Thank you.  
 15 My second question zooms into this idea of how  
 16 a particular power plant is assigned a specific part of  
 17 the load curve. That really seems to me an important  
 18 piece of the puzzle between whatever characteristics of  
 19 the regional grid and the way a plant will be operated.  
 20 I think you gave the example yesterday of how you  
 21 can't just assume that a solar plant thousands of  
 22 kilometres further away would be complementary or can  
 23 just come in. And you can probably make the same  
 24 argument that any demand thousands of kilometres further  
 25 away can't directly be supplied by that plant.

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14:32 1 So that is all intricacies of how a system of the  
 2 magnitude and the complexity of the Northern Grid is  
 3 managed that might influence what is essentially  
 4 an agreement between the network operator and the dam  
 5 operator of what is the specifically assigned proportion  
 6 of the load curve that the plant will be responsible  
 7 for. Again, that follows directly out of the US ACE  
 8 definition of "firm power".  
 9 Could you elaborate a bit more on what you think are  
 10 reasonable aspects to take into account when a decision  
 11 is made about the particular role of that plant within  
 12 that larger grid?  
 13 MR RAE: Well, I think we have to go back to how you  
 14 actually use these plants. And what is normally going  
 15 to be done is that on every day of the year,  
 16 especially -- yes, on every day of the year, a plant  
 17 operator will sit down, do his own working for how much  
 18 energy he thinks he's going to have that day. He'll  
 19 have forecasts of the river flow or whatnot, which he  
 20 deals with on a daily basis. He will then transmit that  
 21 information into the system operator, and he will say,  
 22 "I've got X amount of megawatt hours available and I can  
 23 give you Y amount of megawatts".  
 24 That goes to the system operator, who then sends  
 25 back to them a dispatch instruction saying, "Start your

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14:34 1 plant at 8.00 am", or whatever, "and operate at 400 MW,  
 2 and operate for X number of hours". And that's the  
 3 instruction he gets back. And this happens on a daily  
 4 basis for every plant.  
 5 But they're done on a 24-hour-ahead basis. So the  
 6 operator is forecasting what he's got based on his  
 7 hydrological forecasts. The system operator is then  
 8 taking all of the information he gets from all of the  
 9 plants available to him and he is matching that to his  
 10 system load demand.  
 11 So it's not as if he's allocating one part of it, or  
 12 one period; it's that it's all being aggregated as  
 13 what's available. But it's being done dynamically day  
 14 by day; it's not something prejudged and then is fixed  
 15 for the life of the plant. It's a dynamic thing that's  
 16 always done.  
 17 And the key thing is: when you go through that  
 18 process, you're offering what you can dispatch. And the  
 19 dispatch -- you're not going to be offering, "I can have  
 20 one hour of 1,000 MW", because it doesn't work that way.  
 21 PROFESSOR BUYTAERT: But at the same time, obviously when  
 22 a plant is designed, that already takes in mind the  
 23 potential role of that plant within the broader system,  
 24 doesn't it?  
 25 Just to give one example you mentioned earlier:

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14:35 1 emergencies. For example, if the plant operator -- or  
 2 designer, [when] the plant is being designed and  
 3 implemented, and the network controllers agree that  
 4 a plant should be able to, for example, account for  
 5 an emergency, particularly because, for example,  
 6 hydropower is a power source you can spin up very  
 7 quickly, so if they make an agreement and say, "Well,  
 8 your plant should be able to come in if there's  
 9 an emergency" -- for example, a power transmission  
 10 failure -- "and we really need this plant to be able to  
 11 spin up and provide as much power as it can, while  
 12 waiting for other slower power sources to come online",  
 13 that obviously would have implications for the amount of  
 14 pondage that that plant would need to have to provide  
 15 that specific type of service, which again I could  
 16 imagine India making such a case.  
 17 Would you consider that a reasonable factor to take  
 18 into account when pondage is being calculated in the  
 19 design process of a plant?  
 20 MR RAE: I would agree with you that that service is  
 21 required. And part of the role of the dispatch and the  
 22 system planning people is to make sure that reserve  
 23 capability is available. However, you've got to  
 24 remember: with a pumped storage project, during the wet  
 25 season especially, that plant is normally operating

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14:37 1 close to its full capacity. So it no longer has  
 2 an ability to provide that service: it's absolutely flat  
 3 out, and therefore there's no reserve available.  
 4 So in that wet season, some other plants in the  
 5 system are able to provide that service, and those same  
 6 plants still exist when you come to the dry season. So  
 7 we're not in a situation that we're saying: well, all of  
 8 this system reserve capability falls to the role of  
 9 these few hydropower projects in the Indus Basin.  
 10 They're actually a small part of the total.  
 11 But in the dry season, yes, there is a need for  
 12 spinning reserve, which is one of the reasons  
 13 I mentioned yesterday why you don't want to operate your  
 14 plant at the full discharge capacity. You want to  
 15 operate it down at the best efficiency or even lower,  
 16 because then that is giving you reserve capability.  
 17 It's spinning, it's operating; and if it has to, it can  
 18 increase from the 80% up to the 100% very quickly. And  
 19 that's a spinning reserve capability which is saying:  
 20 yes, you should operate down lower.  
 21 The other use of having energy storage available for  
 22 dispatch, this is one of the uses of paragraph 15, in  
 23 that to the extent that something unusual happens in the  
 24 system, you are able, using the limits of paragraph 15,  
 25 to increase the discharge from the available pondage and

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14:38 1 supply that short-term disruption in the power system.  
 2 But keeping in mind any one of these run-of-river  
 3 projects has a very limited amount of energy available  
 4 to them, and that's limited by the hydrology; it's not  
 5 limited by the pondage. And to the extent that it's  
 6 limited by the hydrology, the number of hours of  
 7 additional energy it can provide in an emergency is  
 8 within that limit.  
 9 So yes, whatever pondage is there, you discharge it  
 10 according to the limits of paragraph 15, and then you're  
 11 up against the constraint of hydrology. So you'd get  
 12 another hour or two of peak reserve. But beyond that,  
 13 other plants in the system are also sharing this  
 14 disturbance, whatever it may be.  
 15 PROFESSOR BUYTAERT: Thank you. Clearly, the more pondage  
 16 you've got available, the higher that spinning reserve  
 17 will be; is that right?  
 18 MR RAE: No, spinning reserve is something which is  
 19 happening in minutes, it's not happening over periods of  
 20 hours, because what you're trying to do in a spinning  
 21 reserve is -- for hydropower anyways -- over a few  
 22 minutes, you pick up load, which gives the power system  
 23 time to mobilise other generation resources.  
 24 So to the extent that there is a disruption, maybe  
 25 1,000 MW, the various hydro plants will react, and

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14:40 1 they'll cover that 1 to 15 minutes or 30 minutes of  
 2 higher load, but then you'll be ramping up the output  
 3 through other plants in the system. And typically you  
 4 would start to ramp up -- whether a gas-fired combined  
 5 cycle plant, which can also move quite quickly; or if  
 6 it's going to be a longer period, you start to increase  
 7 one of the coal plants or something, which can ramp up  
 8 to some degree, but they're slower.  
 9 Now at the other direction, less than the minutes,  
 10 we're into disturbances of milliseconds, milliseconds  
 11 and seconds, and that's beyond the capability of hydro  
 12 to deal with it, because those disturbances move too  
 13 quickly for hydro. And they occur in modern power  
 14 systems because of the absence of the other renewable  
 15 resources, such as solar and wind. And that's where the  
 16 role of battery energy storage systems has become very  
 17 important in these. And they work in hybrid with the  
 18 hydro, so that they cover the very short periods, hydro  
 19 covers the minutes, and then other thermal plants are  
 20 picking up the hours.  
 21 So again, it's not having a material change on the  
 22 pondage, and certainly not in a way that would enter the  
 23 design calculation stage as the way you're suggesting.  
 24 PROFESSOR BUYTAERT: Okay, thank you. I think that's all.  
 25 THE CHAIRMAN: Mr Rae, just a couple of questions from me;

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14:42 1 one following on the conversation you just had with  
 2 Professor Buytaert.  
 3 When I look at the dispositif that was proposed by  
 4 Pakistan in its Memorial, it says in  
 5 subparagraph (2)(e):  
 6 "The needs of the power system will be determined by  
 7 reference to a load curve representative of typical  
 8 demand during the dry season ..."  
 9 I understand basically what is being said there.  
 10 What I'm wondering is: based on the conversation you  
 11 just had, is it your view that it is only determined,  
 12 the needs of the power system are only determined by  
 13 reference to a load curve representative of the typical  
 14 demand during the dry season, or are any of the factors  
 15 that Professor Buytaert was suggesting to you ones that  
 16 should also be referred to or taken into account in  
 17 designing the system?  
 18 MR RAE: Those other factors are what's included in the  
 19 provision of paragraph 8(c) for doubling the amount of  
 20 pondage. Whatever you calculate for normal operation,  
 21 you've doubled it. So you've created a safety factor.  
 22 And that's dealing with -- or that's giving you surplus  
 23 capacity to deal with these sorts of factors that might  
 24 come up in the unusual events of the power system. And  
 25 unusual events happen every day, I'm sure.

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14:43 1 But that's one of the -- or that's a purpose of that  
 2 margin, is to account for these things. So you don't  
 3 want to have a built-in safety factor and then start to  
 4 explicitly compute all of the uncertainties and add it  
 5 on top of the safety factor. That starts to become  
 6 a redundant approach.  
 7 THE CHAIRMAN: Okay. I think the Court will need to think  
 8 about this from the Treaty interpretation perspective,  
 9 where arguably there is a process of calculation of  
 10 pondage that then going to be doubled to be maximum  
 11 pondage.  
 12 What we're trying to sort out here in the first  
 13 instance is the calculation of pondage. And if  
 14 I understand correctly, your position is that this  
 15 should be done exclusively with reference to a load  
 16 curve representative of typical demand in the dry  
 17 season?  
 18 MR RAE: Correct, that's what I'm saying.  
 19 Now, I'm going to leave it to Dr Miles to say  
 20 specifically on this matter, but the reading of the  
 21 Treaty says -- it's referring specifically to the load  
 22 of the plant. It's not referring to the load of the  
 23 plant plus standby reserve, plus spinning reserve, plus  
 24 sedimentation storage and whatnot. It's saying: the  
 25 load of the plant, and anything beyond that narrow

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14:45 1 definition is what's falling in that safety factor.  
 2 And I'll leave that specifically to Dr Miles on  
 3 the interpretive part of the Treaty.  
 4 THE CHAIRMAN: That's fine.  
 5 Final question from me is: also in the dispositif is  
 6 the phrase "the hydrology of the HEP site". Based on  
 7 what you just said, I understand you to view that phrase  
 8 as referring exclusively to the power of the river. Is  
 9 that correct, or is there some broader aspect of the  
 10 phrase "hydrology of the HEP site" that is meant by  
 11 that?  
 12 MR RAE: For the purposes of pondage, we are given from the  
 13 Treaty that the reference discharge is the minimum mean  
 14 discharge. So we have a single input for that, and that  
 15 becomes an explicit amount coming through.  
 16 Hydrology of the river is, however, pertinent for  
 17 the computation of the installed capacity, which India  
 18 does by valuing the firm and secondary energy available  
 19 to it, which of course is directly related to the -- the  
 20 secondary energy, in particular, is directly related to  
 21 the hydrology of the river and has a variable nature to  
 22 it. The firm energy is the fixed part, which is at the  
 23 minimum mean discharge. So it's a fixed amount.  
 24 Hydrology of the river talks to the secondary energy and  
 25 their optimisation of the installed capacity.

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14:46 1 THE CHAIRMAN: And it's exclusive of, say, geomorphology of  
 2 the site; is that correct?  
 3 MR RAE: How do you mean, geomorphology?  
 4 THE CHAIRMAN: Perhaps sedimentation?  
 5 MR RAE: Well, hydrology itself is saying: this is the flow  
 6 available for the design. The hydrology has  
 7 a relationship to the sedimentation because it's also  
 8 the transport medium for the sediment. You can't have  
 9 sedimentation without hydrology, and the two work  
 10 together in that sense. But the sedimentation is  
 11 a byproduct of the fact that you have a river flow.  
 12 So I don't see the sedimentation having an input to  
 13 the selection of the installed capacity. It does affect  
 14 the overall design of the site, as we have discussed in  
 15 previous presentations. And it also does not come into  
 16 the calculation of pondage because it's not included in  
 17 that interpretation.  
 18 THE CHAIRMAN: I'm just purely trying to determine what  
 19 your view is of "hydrology of the HEP site", that's all.  
 20 MR RAE: Yes.  
 21 THE CHAIRMAN: And I understand you to be saying: it relates  
 22 to the power of the river throughout the season, but  
 23 it does not relate to any other factors.  
 24 MR RAE: Well, it of course relates to sediment, because  
 25 the two go hand in hand. But for the design of the

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14:48 1 plant, it's used to select the installed capacity and  
 2 then it tells the plant owner how much revenue they can  
 3 expect to achieve from the plant under various operating  
 4 models, and this then goes into the economic  
 5 optimisation of what is the correct installed capacity.  
 6 THE CHAIRMAN: Okay. Thank you very much.  
 7 I think we are through with questions for you.  
 8 Thank you again, Mr Rae, for a very helpful  
 9 presentation.  
 10 I believe we are going on to Dr Morris in due  
 11 course. But, Sir Daniel, I think we may be at the break  
 12 point.  
 13 SIR DANIEL: I think, Mr Chairman, that would be helpful and  
 14 it is the time.  
 15 THE CHAIRMAN: And are you content with us going on break  
 16 until 3.15 or are you concerned about the time?  
 17 SIR DANIEL: I think we probably are content [with] going to  
 18 3.15, yes.  
 19 THE CHAIRMAN: Okay, that's fine. Then let's reconvene at  
 20 3.15. Thank you.  
 21 (2.49 pm)  
 22 (A short break)  
 23 (3.18 pm)  
 24 THE CHAIRMAN: Dr Morris, you're welcome to begin your  
 25 presentation whenever you're ready.

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15:20 1 And you will note that the design discharge for  
 2 Baglihar, which is 900 MW, is quite low compared to your  
 3 wet-season flows, and very high compared to your  
 4 dry-season flows. And this flow variability is what  
 5 establishes the framework in a Himalayan hydropower  
 6 project that renders its power peaking ability to be  
 7 quite heavily restricted.  
 8 Perhaps we can go to the next slide (4). So let's  
 9 take that same data you saw on the first slide, and  
 10 we'll truncate it at 900 MW. And I've converted this  
 11 now into megawatt hours per day, because I'm going to be  
 12 speaking the rest of the time about energy: how much  
 13 energy we can deliver in a peaking or non-peaking  
 14 scenario.  
 15 And you'll notice that the plant has a truncated top  
 16 because when you have flows that are in excess of the  
 17 plant capacity, you have no peaking capacity. In other  
 18 words, your plant is going to be operating at full  
 19 power. And it may be operating at full pool, full  
 20 operational pool, or it may be operating at the minimum  
 21 pool.  
 22 I believe previously a question was raised about the  
 23 relationship between the peaking operations and the  
 24 operation during the monsoon, and also a question about  
 25 sediment as it relates to peaking and pondage. And to

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15:18 1 DR MORRIS: Thank you. (Pause)  
 2 Greetings to the Court this afternoon. It's my  
 3 great honour to be able to address you once again.  
 4 I want to apologise for using my little headpiece,  
 5 because my tropical bald head isn't accustomed to this  
 6 climate.  
 7 What I want to do today is I want to talk about  
 8 technical limitations on pondage, because there's been  
 9 quite a bit of discussion about how these plants will  
 10 work and fit into the grid in providing peak power. And  
 11 what I want to show today is that these plants, because  
 12 of their technical limitations and the limitations  
 13 imposed by hydrology, are actually not very useful to  
 14 a grid, because their peaking capacity is (1) very low,  
 15 and (2) their peaking capacity is not predictable.  
 16 And the other thing that I would like to have  
 17 a little example is we talked about how plants can  
 18 adjust to future conditions. So I will give you a brief  
 19 example, at the end of this presentation, of a plant  
 20 that I'm personally familiar with, an old plant.  
 21 (Slide 3) This is, as you will recognise, the daily  
 22 flow of the Chenab. These are the data from Baglihar,  
 23 and I'll be using Baglihar throughout, in every slide  
 24 except for one. These are data that were provided under  
 25 a prior proceeding.

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15:22 1 bring this back to our prior discussions about sediment,  
 2 one of the strategies is to keep the pondage low during  
 3 the monsoon. And if you're not using that strategy of  
 4 sediment sluicing, then you could keep it high. If you  
 5 keep it high, of course you have more energy.  
 6 So if you didn't have a constraint imposed by  
 7 sluicing sediment, you would operate continuously  
 8 [at a] high level. Or if you have a sluicing operation  
 9 during the season, you operate continuously at a low  
 10 level. Then in either case, you're not emptying and  
 11 filling and emptying and filling the pondage pool.  
 12 In other words, that operational pool can only  
 13 operate as pondage and only operate to address peak  
 14 loads if you can fill it and empty it. Filling it up,  
 15 and then you empty it to address the peak load by  
 16 producing peak power.  
 17 Let's go to the next slide (5), because I think that  
 18 one is pretty understandable. This is a little bit more  
 19 conceptual, but you have to think that when you have  
 20 a reservoir that is completely full during the monsoon,  
 21 you cannot peak power because it's always full.  
 22 So if we go to the right-hand side, this is data  
 23 from Kiru, which you had already previously calculated.  
 24 But the same shape of the graph is the same for all  
 25 hydropower plants. There is this relationship, which

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15:23 1 is: all you do is you change the axis for river flow,  
 2 and you get this curve.  
 3 So what happens is that when you are running at full  
 4 capacity, your peaking power capacity is zero. On the  
 5 left-hand side of the graph, if you have zero flow in  
 6 the water, your peaking capacity is also zero.  
 7 So on the right-hand side of the graph, your peaking  
 8 capacity is limited by the amount of storage that you  
 9 can empty. In other words, if you're running the plant  
 10 almost at peak power, you can't empty at pondage point.  
 11 You can only draw it down a little bit, because if  
 12 you're going to empty the pool and then refill, and  
 13 empty and refill, your refill cycle is going to be very  
 14 short, because at peak power you have no additional  
 15 capacity that you can take away from the pondage pool.  
 16 In other words, you have a certain amount of power  
 17 available, and you can turn the machines off for, let's  
 18 say, 30 minutes in a day to capture water, so that  
 19 the rest of the day you can run at full power.  
 20 So the concept is that as your plant generating --  
 21 given a generating capacity, as your actual plant  
 22 generation declines because of hydrology -- less flow --  
 23 the amount of water you can store in your peaking pool  
 24 goes up. And that even-match point occurs with 12 hours  
 25 of filling and 12 hours of emptying.

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15:27 1 on that date.  
 2 So let's go to the next slide.  
 3 PROFESSOR MINEAR: Excuse me, Dr Morris. Before we go to  
 4 the next slide, is there a typographical error on your  
 5 chart there? On the right side of the graph, it says  
 6 "Limited by low flow". Should that be "Limited by high  
 7 flow"?  
 8 DR MORRIS: Oh, excuse me, it should be "high flow", yes.  
 9 Pardon me. Your proofreading is much better than mine!  
 10 So let's go to the next slide (6). And let's talk  
 11 about a different type of hydro plant, which is a pumped  
 12 storage plant. These plants are designed and built  
 13 specifically for power peaking. And the key difference  
 14 between a pumped storage plant and a run-of-river plant  
 15 is in pumped storage you control your hydrology: you  
 16 know how much water you're going to have every single  
 17 day of the year from now for the next 20 years, or  
 18 50 years.  
 19 There is actually a pumped storage plant in the  
 20 United States, the Rocky River Plant in Connecticut has  
 21 been operating since 1929, and they have an amount of  
 22 storage which is predictable into the future. Why?  
 23 Because the upper storage and the lower storage are both  
 24 based on an engineering design. In other words,  
 25 hydrology in a pumped storage plant is controlled by

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15:25 1 So then you turn around, and the bottom part is when  
 2 you can't fill the pondage pool because you don't have  
 3 enough water. So you can basically say, on the  
 4 right-hand side, you can't empty the pool; on the left,  
 5 you can't fill the pool.  
 6 And the key point here is that the operation of  
 7 a hydropower plant, a run-of-river hydropower plant for  
 8 pondage, for peaking power, is entirely dependent on  
 9 your hydrology. If you have a storage plant where you  
 10 have six months of water in storage, you can turn it on  
 11 and off as you want because you have plenty of water.  
 12 But for a run-of-river plant, you are tied to the daily  
 13 hydrology of the river, which of course, in the case of  
 14 Himalayan rivers, is highly variable throughout the  
 15 year.  
 16 And you also have the problem of predictability,  
 17 because you need a peaking plant on Tuesday, on  
 18 Wednesday, on Thursday of next week, on Friday a month  
 19 in the future. You need to be able to predict what that  
 20 plant is going to give you if you're going to tie it in  
 21 as a reliable part of a grid. And if you're trying to  
 22 evaluate and predict daily hydrology, that is something  
 23 you cannot do. You can say, "I know what the flows in  
 24 September will be", within a range, with a certain  
 25 statistical probability, but you don't have a firm power

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15:28 1 design; it's not dependent on hydrology.  
 2 Let's go to the next one (7).  
 3 Now what I've done here is I have taken the example  
 4 of Baglihar. And at the top you see the red line,  
 5 that's the design capacity of the plant: 900 MW by  
 6 24 hours is equal to 2,160 MWh per day.  
 7 If you go down, you see a green line, and that's the  
 8 capacity for a 900 MW pumped storage plant. And it is  
 9 also predictable; in other words, this is the amount of  
 10 storage you can have any day of the year.  
 11 You go to the bottom line, the blue line, and this  
 12 is what you would have for Baglihar in the year 1982.  
 13 We just selected that as a typical year from the very  
 14 limited data we have.  
 15 And you'll notice that on the left- and the  
 16 right-hand side, the daily peaking energy available is  
 17 quite low, and it goes up as the monsoon ramps up, and  
 18 then drops back down to zero. It drops back down to  
 19 zero because now you're running at full capacity during  
 20 the monsoon, so you have no peaking capacity at all.  
 21 You're now running as a baseload plant.  
 22 Then the monsoon starts to fall down again, and now  
 23 you're starting to get the ability to empty -- a power  
 24 peaking pool, your operational pool, can be emptied,  
 25 partially, gradually, until you run out of water. And

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15:30 1 then the curve keeps on going down until you're back  
 2 into the winter and your limiting factor is again not  
 3 enough water.  
 4 So when you compare the performance of a peaking  
 5 power plant by design -- a pumped storage, for  
 6 instance -- you can see it's very predictable and it  
 7 produces a lot of peaking power, including summer, when  
 8 you may have peaks and -- your power may fluctuate  
 9 because of solar, clouds coming across, sudden demand  
 10 because of a very hot day. And that makes the pumped  
 11 storage and those other types of peaking plants -- for  
 12 instance, you can have the gas turbine plants, which are  
 13 usually used for peaking, and you can have this as  
 14 predictable availability.  
 15 The numbers that correspond to each of these are the  
 16 following. For your 900 MW pumped storage plant, and  
 17 assuming a 90% efficiency in your pump-up period, you  
 18 are going to have about 3,548 GWh per year. In Baglihar  
 19 for 1982, we didn't have 3,548; we had 851 GWh, a very  
 20 small amount. The Baglihar itself, assuming that --  
 21 again, using data from 1982, would produce 3,848 GWh  
 22 a year. So the total amount of total capacity of  
 23 Baglihar in 1982 was about the same as the peaking  
 24 capacity for an equivalent size peaking plant. And the  
 25 peaking capacity of Baglihar, operated as a run-of-river

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15:34 1 a wet year different, and climate change may come in and  
 2 change these numbers. But you also have your plants  
 3 that are designed for peaking, the gas turbine plants  
 4 and a pumped storage plant, and they have predictable  
 5 energy available for power peaking.  
 6 And one other thing that I would like to just touch  
 7 on, which also comes into this peak power availability,  
 8 is that this is a grid. And on a grid, you don't always  
 9 have to determine: I'm going to have to start another  
 10 plant or bring another unit online; you can pull it off  
 11 from your neighbouring plants or neighbouring grid.  
 12 This is, of course, what happened to Texas, as was  
 13 mentioned yesterday. They are not connected to  
 14 a national grid in the United States. They had  
 15 a problem with their power, very cold climate there,  
 16 some of their units went down, and they couldn't  
 17 interconnect, they had no interconnections, and so they  
 18 had basically a catastrophe. And that's what the grid  
 19 connection does.  
 20 So when you're facing an unanticipated load and  
 21 you're on a grid, you call on your neighbours.  
 22 So let's go to the next slide (8).  
 23 THE CHAIRMAN: Dr Morris --  
 24 DR MORRIS: Yes.  
 25 THE CHAIRMAN: -- before you move on, can you just confirm

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15:33 1 plant with pondage, is about 20% of those other two  
 2 scenarios.  
 3 So the idea here that I want to try and convey is  
 4 that there are limitations on pondage imposed by the  
 5 Treaty, but this analysis is done without any type of  
 6 Treaty limitations. And it just shows that in the  
 7 absence of Treaty limitations -- and of course the  
 8 Treaty limitations provide for double pondage anyway --  
 9 even in the absence of any limitation, by Treaty or any  
 10 other reason, the ability of these types of plants in  
 11 this environment to provide pondage, provide peaking  
 12 power from pondage, is quite limited just because of  
 13 the nature of the hydrology.  
 14 So the idea here is just: I want to have you  
 15 understand that there's -- the discussion about -- and  
 16 we have repeated questions about the ability of this  
 17 plant to be a realistic source of peaking energy -- has  
 18 to face this obstacle that if you are planning  
 19 a project, you're planning in the future how much  
 20 I'm going -- or you're planning how I'm going to do my  
 21 year-ahead plan for operation of the grid, you are faced  
 22 with: do I want to use and can I rely on this  
 23 run-of-river plant, with its unpredictability?  
 24 And of course if I plot 1983, it will be different  
 25 from 1982, 1984 will be different, and a dry year and

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15:36 1 to me that the data on the last slide (7) and the data  
 2 that you read into the record is in our record  
 3 somewhere --  
 4 DR MORRIS: Yes.  
 5 THE CHAIRMAN: -- not only in the Baglihar proceedings?  
 6 DR MORRIS: Yes. Abdullah has the reference, and it's  
 7 referenced on the -- there it is, see: "from P-0585"  
 8 (slide 3).  
 9 THE CHAIRMAN: So that's true with respect as well to  
 10 slide 7: that if we go to P-0585, we'll find that data  
 11 there?  
 12 DR MORRIS: No. What I have done -- P-0585, it's a table,  
 13 written tables, on paper. So last night we entered  
 14 these data into the spreadsheet and did the analysis  
 15 from the data we entered from the tables. So we're  
 16 using the data, but the analysis that derives from  
 17 the tabulated data [is], of course, our analysis.  
 18 THE CHAIRMAN: So this slide 7 is a demonstrative of the  
 19 data that we would find coming out of the Baglihar,  
 20 P-0585?  
 21 DR MORRIS: Yes, it is an analysis of that data.  
 22 THE CHAIRMAN: Thank you.  
 23 DR MORRIS: Let's go to the next slide (8). Okay. Okay,  
 24 thank you. Sorry if I was pushing ahead.  
 25 I just want to give one example of longevity and

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15:37 1 adaptability of hydropower plants, and this is based  
 2 from my own personal experience.  
 3 (Slide 9) I'm just pulling up on the screen here the  
 4 oldest plant that I have ever worked with, and this is  
 5 the La Oroya Plant in Peru, built in 1914. It's as  
 6 small as 9 MW, which was of course a substantial plant  
 7 at the time.  
 8 This is a plant that was originally constructed to  
 9 serve a mine. There is a large mining district in  
 10 La Oroya. But over the years, the mine eventually  
 11 closed down and the plant converted to supplying other  
 12 markets.  
 13 Now, this plant built in 1914 is still operating,  
 14 and you can see on the bottom picture it's operating  
 15 with its original equipment. This is equipment  
 16 installed in 1914, it's still operating today. They  
 17 have, of course, done maintenance on it -- they had to  
 18 rewind the generators and things like that -- but it's  
 19 original equipment. The original dam, the original  
 20 powerhouse, everything is original.  
 21 So I'm just bringing this up in photographic form to  
 22 give you a pictorial representation that hydropower  
 23 plants are inherently long-lived. I don't know of any  
 24 other industrial plant in the world built 100 years ago  
 25 that's operating today profitably and efficiently.

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15:39 1 Hydropower does that because it's a well-developed,  
 2 well-known technology [that] has been around for a long  
 3 time.  
 4 So this plant, even though the market conditions  
 5 have changed in an extraordinary manner since 1914,  
 6 a totally unpredictable and unknowable manner, despite  
 7 [those] changes, the plant continues to operate  
 8 efficiently and produces power on a commercial basis.  
 9 This is not a museum piece; this is a commercially  
 10 operating plant. And it does this by changing its  
 11 operating rule; it doesn't have to change its  
 12 infrastructure.  
 13 So that's just a point that I wanted to touch on  
 14 again, is that these plants will always have future  
 15 conditions that change. Future conditions will always  
 16 be changed; they will always be predictable within  
 17 a certain realm of possibility, but still inherently  
 18 unknowable. And these plants have the capacity, by  
 19 changing their operation, to deliver electricity, as  
 20 a component of the grid, as the grid evolves.  
 21 So it is not necessarily a requirement at this time  
 22 for a particular plant to project future loads on the  
 23 grid, grid-wide. But the plant owner and operator will  
 24 build and finance a plant based on the near-current or  
 25 recent historical conditions. You don't know what's

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15:41 1 going to happen in the future.  
 2 If you're on a market system -- I'm very familiar  
 3 with the one in Peru -- their prices have varied  
 4 considerably. There was a period where they didn't do  
 5 sufficient investment in their power production and  
 6 their prices went up over \$200/MWh, which is very high.  
 7 Normally your prices are more like \$50.  
 8 So I think that's the end of what I wanted to  
 9 present to you. And I would be open to -- wait, there's  
 10 one more slide.  
 11 (Slide 10) What I want to conclude with is that:  
 12 [(1)] These Himalayan plants do have a limited  
 13 capacity to produce peaking energy, and this is  
 14 an inherent technical limitation imposed by hydrology.  
 15 (2) The day-to-day peaking energy depends on your  
 16 daily hydrology, which is itself inherently  
 17 unpredictable. You can say, "Yes, I know more or less  
 18 how much water I'm going to have next year", but you  
 19 can't do it on a day-to-day basis, and the grid operator  
 20 has to have day-to-day.  
 21 (3) Peaking energy available from a Himalayan  
 22 run-of-river plant will be inherently very small  
 23 compared to the plant's design capacity, and also  
 24 unpredictable. As such, it represents a small and  
 25 unreliable peaking supply for system planning.

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15:42 1 (4) In contrast, storage hydropower, pumped storage  
 2 hydropower, battery storage systems, gas turbines,  
 3 they can all deliver design power on a reliable and  
 4 predictable basis. And all of these are rapid-start-up  
 5 plants. We don't have coal here, there's no nuclear  
 6 plants here; these are all rapid-start-up, rapid-ramping  
 7 plants. And for this reason, the operators of the grid  
 8 rely on these reliable sources of power for power  
 9 peaking.  
 10 [(5)] And finally, hydropower plants are very  
 11 long-lived, and the original equipment can operate many  
 12 decades, adjusting the operating rule to accommodate  
 13 future and unpredictable changes in the market and  
 14 the load.  
 15 So that concludes.  
 16 THE CHAIRMAN: Thank you very much, Dr Morris.  
 17 Dr Morris, I think you have stumped us: we have no  
 18 questions for you. That doesn't mean your presentation  
 19 was not extremely helpful; I found it quite useful and  
 20 interesting, so I appreciate it. But you are released  
 21 from further duties, as we have no questions for you.  
 22 DR MORRIS: Thank you.  
 23 THE CHAIRMAN: And I believe now we have Dr Miles. So  
 24 you're welcome to the podium, sir, and please begin when  
 25 you're ready.

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15:44 1 DR MILES: (Slide 1) Mr Chairman, members of the Court,  
 2 I said I might be back, and good fortune has brought us  
 3 together again. I will be addressing you once more on  
 4 the legal aspects of pondage.  
 5 (Slide 2) You posed a number of helpful questions to  
 6 me yesterday which I said I would go away and think  
 7 about, and in light of that, I propose to structure my  
 8 remarks as follows.  
 9 First, I will return briefly to the golden thread  
 10 that is flowing through all of Pakistan's submissions  
 11 today, which is how installed capacity and anticipated  
 12 load are to be taken into account in the determination  
 13 of pondage under paragraph 8(c).  
 14 Second, I will go on to address your questions. And  
 15 those questions fall within two broad themes, around  
 16 which I will structure the rest of my remarks.  
 17 First, the idea of a realistic, well-founded and  
 18 defensible projection of installed capacity and, more  
 19 particularly, anticipated load requires that projection  
 20 to be evidence-based. And in this, I'll pick up on some  
 21 of the ideas trailed by Sir Daniel.  
 22 Second, I'll examine what's wrong with India's  
 23 position on the interpretation and application of  
 24 paragraph 8(c).  
 25 And finally, I have one orphan question to be

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15:46 1 bit -- what this schema does is hold India accountable  
 2 as a matter of process. India, throughout each of the  
 3 relevant steps in that process, but especially step 3,  
 4 must undertake an evidence-backed exercise on the basis  
 5 of certain information, and then use that information to  
 6 tell Pakistan how it has calculated the HEP's installed  
 7 capacity and anticipated load.  
 8 Once these have been established to the requisite  
 9 degree, India then uses them to provide us the  
 10 scheduling -- that is, Pakistan -- the scheduling of  
 11 firm power. And Mr Rae showed you from an engineering  
 12 standpoint how straightforward that process can be.  
 13 And that schedule is then moderated, to the extent  
 14 needed, by paragraph 15, and any e-flow requirement in  
 15 steps 4 and 5, before, in step 6, selecting the largest  
 16 amount of pondage required to meet the schedule as  
 17 the pondage required for firm power.  
 18 Following the paragraph 8(c) doubling of that under  
 19 step 7, we have the maximum permissible size of the  
 20 HEP's operating pool.  
 21 So that's how the process I set out yesterday fits  
 22 together in light of the elaborated information  
 23 submissions that Sir Daniel earlier provided, and I will  
 24 turn now to the Court's questions.  
 25 (Slide 6) During my presentation yesterday, the

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15:45 1 addressed after that, hopefully shortly, on the subject  
 2 of e-flow.  
 3 (Slide 3) So returning first of all to the question  
 4 of how this fits together.  
 5 (Slide 4) Yesterday I spent a bit of time on how  
 6 Pakistan considers how the Court's findings on pondage  
 7 in the General Issues Award might be operationalised,  
 8 and I ultimately proposed the process on the slide,  
 9 reflecting an elaboration of what is set out in Part 3D  
 10 of Pakistan's Memorial.  
 11 The Court will recall that within that process,  
 12 installed capacity and anticipated load must be taken  
 13 account of in step 3. And what we now have is the  
 14 information that India must provide under paragraph 9  
 15 and Appendix II to establish that these elements are  
 16 realistic, well-founded and defensible.  
 17 Now, as Sir Daniel set out, the critical information  
 18 is the existing load curve for the Northern Region, with  
 19 real underlying data; anticipated future load, with  
 20 justification, if India wishes to take account of  
 21 possible changes in plant loading in the future; and  
 22 installed plant capacity, with a justification, given  
 23 the hydrology of the HEP site and the results of the  
 24 anticipated load analysis.  
 25 As Sir Daniel said -- and this is the important

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15:48 1 Court, at least from my vantage point at the podium,  
 2 appeared concerned with the idea that Pakistan is in  
 3 this hearing trying to lock India in a box, to say that  
 4 India must take the power system as it exists at the  
 5 time the HEP is notified to Pakistan, and fix the  
 6 anticipated load by reference to that load curve and no  
 7 other.  
 8 I was therefore confronted with numerous questions  
 9 from Professor Minear, Professor Buytaert and the  
 10 Chairman; the transcript references are there on the  
 11 slide. But from my perspective, again at the podium,  
 12 you all seemed to be getting at, broadly speaking, the  
 13 same thing: what happens if India perceives at the point  
 14 of design that its needs may change to require  
 15 a different anticipated load for the HEP, and thus  
 16 a different pondage? The word "flexibility" was used on  
 17 more than one occasion.  
 18 Now, the Court's concern is far from unreasonable  
 19 when the HEP, as Professor Buytaert was at pains to  
 20 highlight, will be intended to last for decades and make  
 21 a meaningful contribution to the power system during  
 22 that time. And I was perhaps not as clear in my answer  
 23 as I could and should have been, but let me be clear  
 24 now.  
 25 Pakistan is not trying to put India in a box.

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15:49 1 Indeed, it is not at all adverse to India's projection  
 2 of anticipated load -- both words that imply some kind  
 3 of forecasting -- taking account of what it thinks  
 4 the power system may do in the future.  
 5 Indeed, as Mr Rae pointed out just now, that type of  
 6 forecasting is in fact a totally normal part of the  
 7 whole exercise of designing a HEP that is likely to  
 8 outlive its designers. Nobody sinks billions of dollars  
 9 into an infrastructure project of this kind without  
 10 having a pretty firm grip of what's over the horizon.  
 11 And the sizing of an operating pool is no different in  
 12 this respect.  
 13 (Slide 7) But within the framework set down by the  
 14 Court in the General Issues Award, India is not allowed  
 15 to merely speculate about the future.  
 16 Back on the slide we have our general principles,  
 17 all of which point in the same direction: anticipated  
 18 load is the expected daily and weekly load on the HEP;  
 19 this must be determined on the basis of a "realistic,  
 20 well-founded, and defensible" projection of anticipated  
 21 load; India bears the burden of proving the validity of  
 22 that projection; and that projection must be reflective  
 23 of how the HEP will "actually be operated", and cannot  
 24 be used to inflate the pondage allocation.  
 25 All of this can only be done on the basis of

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15:52 1 require that India provide Pakistan with sufficient  
 2 information to verify that projection.  
 3 The Court will recall that this paragraph was  
 4 a response to Pakistan's submission that Appendix II  
 5 does not require India to furnish Pakistan with a load  
 6 curve, and therefore a load curve is not relevant to the  
 7 calculation of pondage under paragraph 8(c). But, said  
 8 the Court:  
 9 "... that supposition is not persuasive, as  
 10 Appendix II can be read as requiring the provision of  
 11 information as necessary to understand the plant's  
 12 installed capacity and anticipated load. Paragraph 3(b)  
 13 of Appendix II directs that India provide 'calculations  
 14 for the Operating Pool', and Paragraph 4 of Appendix II  
 15 directs that India provide the aggregate capacity of  
 16 power units and expected variations in turbine discharge  
 17 on ... account of load fluctuations. Such provisions  
 18 are had consistent with an interpretation of the  
 19 ordinary meaning of Paragraph 8(c) that calls for  
 20 calculating maximum Pondage using, in part, the plant's  
 21 installed capacity and anticipated load."  
 22 And the Court continued:  
 23 "Such provisions are fully capable of being  
 24 understood as requiring India, when notifying Pakistan  
 25 of its intention to construct [a] ... HEP, to inform

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15:50 1 evidence, of hard data, and hard data that we know that  
 2 India has. As Sir Daniel pointed out earlier, the  
 3 pondage calculation in this respect turns, in addition  
 4 to paragraph 8(c), on paragraph 9 and Appendix II of  
 5 Annexure D.  
 6 (Slide 8) And the Court apparently has this well in  
 7 mind. Back on the slide is paragraph 742 of your  
 8 General Issues Award, where exactly this point was made  
 9 in terms that are difficult for me to improve upon. You  
 10 said there that:  
 11 "... to fulfil its Treaty obligations, India must  
 12 include information and ... explanation relating to its  
 13 calculation of maximum Pondage pursuant to  
 14 Paragraph 8(c)."  
 15 And further, that:  
 16 "... if a difference emerges ... between the  
 17 Parties, it is for India, as the proponent of the design  
 18 and construction of the HEP, to establishing that the  
 19 proposed maximum Pondage satisfies the requirements of  
 20 Paragraph 8(c), bearing in mind any Pakistani position  
 21 that a more Treaty-compliant alternative exists."  
 22 (Slide 9) And the Court also pointed out at  
 23 paragraph 689, as Sir Daniel has already alluded to,  
 24 that India's information provision obligations under  
 25 paragraph 9 and Appendix II are sufficiently broad to

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15:53 1 Pakistan of the plant's installed capacity and  
 2 anticipated load, given that such information would be  
 3 necessary to calculate the Operating Pool and would be  
 4 relevant to the expected variations in the turbine  
 5 discharge."  
 6 Well, if that's correct -- and it must be -- and  
 7 Appendix II requires "the provision of information as  
 8 necessary to understand the plant's installed capacity  
 9 and anticipated load", then this logically extends to  
 10 all data necessary for Pakistan to confirm that India's  
 11 projections of these elements are realistic,  
 12 well-founded and defensible. Without evidence, Pakistan  
 13 cannot be satisfied that India has met the burden  
 14 identified by the Court.  
 15 Now, what happens when there is evidence, as  
 16 Professor Minear put to me? Well, as I said in  
 17 response, I am sure unartfully, Pakistan has to go where  
 18 the evidence leads. And if that evidence shows  
 19 an anticipated load that might appear deeply peculiar to  
 20 Pakistan, [but] is nonetheless realistic, well-founded  
 21 and defensible in context, then, well, Pakistan has to  
 22 accept it, it has to take the rough with the smooth,  
 23 even if the model adopted strains the limit of  
 24 paragraph 15.  
 25 (Slide 10) But what Pakistan is not required to

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15:54 1 accept is a projection based on unknown and unqualified  
 2 events that India cannot even identify with  
 3 particularity, much less properly evidence.  
 4 A projection based on such a foundation, or lack  
 5 thereof, is, by definition, not realistic, well-founded  
 6 and defensible. Rather, it is the kind of  
 7 pondage-expanding load hypothesis that the Court  
 8 expressly rejected in paragraph 743 of the General  
 9 Issues Award, which is now back on the slide.  
 10 (Slide 11) Now, Pakistan is not completely  
 11 unreasonable in this respect. A HEP will be around for  
 12 a long time, and changes to the power system -- which  
 13 may or may not be able to be anticipated at the time of  
 14 the HEP's construction -- can occur. But in such  
 15 a case, engineering or indeed the Treaty itself will  
 16 give India options.  
 17 So far as engineering is concerned, judicious power  
 18 planning at the time of the HEP's design will take  
 19 account of most reasonably foreseeable changes to  
 20 the power system. The data that underpins that power  
 21 planning process can then be provided in summary format  
 22 to Pakistan under Appendix II -- the three elements  
 23 I described earlier -- to enable Pakistan to verify that  
 24 that process is realistic, well-founded and defensible.  
 25 I already took the Court through how Pakistan sees that

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15:57 1 Recognising the utility of paragraph 12(b) in this  
 2 way provides balance to the Treaty framework with  
 3 respect to pondage.  
 4 India is required to justify its operating pool  
 5 design on the basis of a realistic, well-founded and  
 6 defensible projection of anticipated load. This allows,  
 7 as I said, India to account for future power system  
 8 developments in the operating pool at the point of  
 9 design, and justify such accounting to Pakistan.  
 10 India is then able to update the HEP's role within  
 11 the grid as part of an ordinary process of generation  
 12 expansion planning to meet an unanticipated need for  
 13 pondage, and we saw from Dr Morris just how this has  
 14 occurred in the case of the La Oroya HEP.  
 15 And if that process doesn't work or produce  
 16 satisfactory results, then India is free to change the  
 17 HEP under paragraph 12(b), and provide [Pakistan] with  
 18 an updated realistic, well-founded and defensible  
 19 projection of anticipated load at the point of the  
 20 change, at which point the cycle begins anew.  
 21 Judicious use of this process, in my submission,  
 22 will give India ample flexibility and should ensure that  
 23 the HEP retains utility over a significant temporal  
 24 horizon, namely the life of the plant.  
 25 The underlying truth, however, remains: the General

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15:55 1 process working.  
 2 And moreover, ordinary generation expansion planning  
 3 over the lifetime of the HEP will allow for the plant to  
 4 be repurposed within an evolved grid without increasing  
 5 or decreasing the size of the operating pool.  
 6 Mr Rae addressed you on both of these yesterday, and  
 7 did so again today.  
 8 (Slide 12) But if the truly remarkable and  
 9 unexpected happens, and India is somehow, in some  
 10 hypothetical universe, left with a plant that cannot be  
 11 accommodated with its existing pondage within the usual  
 12 process of generation expansion planning, then  
 13 the Treaty gives India an out. It's on the slide: it's  
 14 paragraph [12](b) of Annexure D.  
 15 This allows India to alter the HEP's design after  
 16 it comes into operation. Where that alteration would  
 17 result in a material change to information that Pakistan  
 18 has previously received for that HEP under  
 19 paragraph 9 -- say, increasing the size of the operating  
 20 pool -- India is required to notify Pakistan, which must  
 21 assess, within a reduced period of two months, whether  
 22 the HEP as altered is paragraph 8-compliant.  
 23 In other words, the Treaty itself gives India the  
 24 flexibility to change its HEP design in order to adapt  
 25 to the unexpected.

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15:58 1 Issues Award makes clear that India bears the burden of  
 2 proof with respect to pondage and must prove its  
 3 projections are realistic, well-founded and defensible.  
 4 On any view, the single page of calculations  
 5 traditionally provided by India, as demonstrated by  
 6 Sir Daniel with respect to the Kiru HEP, is not  
 7 acceptable. India must take its paragraph 9 and  
 8 Appendix II obligations seriously. At present, it does  
 9 not.  
 10 "Trust but verify" does not work without the  
 11 "verify". But if India's anticipated load is verified  
 12 as realistic, well-founded and defensible, then  
 13 Pakistan, as I said, must live with it, no matter how  
 14 unlikely it may first appear.  
 15 That's all I wanted to say about projections for  
 16 now. But while I am here, I will sweep up a final  
 17 question.  
 18 Mr Chairman, at Day 1, page 171, line 10 to  
 19 page 172, line 11, you asked me why Pakistan's analysis  
 20 in the Memorial is confined to 18 months of GRID-INDIA  
 21 data for the Northern Region, and I replied: that's all  
 22 the data that Pakistan could get its hands on.  
 23 Now, the control room -- by which I mean Mr Rae --  
 24 has now told me that that was not quite right. We've  
 25 actually managed to pull seven years of data off the

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16:00 1 GRID-INDIA website for the Northern Region. But given  
 2 the rather ambitious cadence of this Second Phase on the  
 3 Merits, we were only able to prepare a proper analysis  
 4 for 18 months; although we did manage, as you saw  
 5 earlier from Mr Rae's presentation, to prepare  
 6 seven years of load duration curves. As I understand,  
 7 they are easier to derive from the data.  
 8 Now, a seven-year analysis exercise would be  
 9 considerable in scope. But once a methodology is fixed,  
 10 a wider analysis, although time-consuming, would be  
 11 possible. I regret I am not able to give much more  
 12 shape to that process as I am only here clearing up any  
 13 misconception that I may have caused inadvertently.  
 14 (Slide 13) This brings me to my second theme, which  
 15 is the deficiencies in India's case. Professor Webb  
 16 will address you further on this by reference to the  
 17 historic correspondence between the Parties, and I will  
 18 focus on India's reliance on calculation using the MMD  
 19 and paragraph 15.  
 20 (Slide 14) Now, India's approach is evident from  
 21 P-0082, which we've looked at a few times already. The  
 22 critical language is highlighted on the slide. And it  
 23 says that, in India's view:  
 24 "... operation rules [with]in Paragraph 15, allow  
 25 India to hold or release water within a band of 50% to

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16:01 1 130% within a period of seven days. Therefore [says  
 2 India], there can be no objection to the Plant  
 3 generating power in any pattern, including peaking, so  
 4 long as it releases water in accordance with  
 5 Paragraph 15."  
 6 So what India is saying here, and I'm paraphrasing:  
 7 "We're calculating in accordance with the MMD in  
 8 paragraph 15, and nothing else. That's what the Treaty  
 9 requires. That's what we're going to do. And you,  
 10 Pakistan, don't get to complain".  
 11 The result of this -- despite India's professed  
 12 commitment to paragraph 2(c), which is also on the  
 13 slide -- is that an anticipated load that meets the  
 14 actual daily and weekly loads on the plant is written  
 15 out of the equation and replaced by paragraph 15, which  
 16 effectively creates a synthetic anticipated load.  
 17 But as the Chairman confirmed yesterday -- page 117,  
 18 line 12 to page 117, line 13 -- that is not the way that  
 19 paragraph 15, as interpreted in the General Issues  
 20 Award, works. Paragraph 15 places a limit on  
 21 an anticipated load; it is not an automatic entitlement  
 22 to anticipated load meeting the limits of paragraph 15.  
 23 Put another way, India must justify its anticipated  
 24 load independently of paragraph 15, by reference to  
 25 a realistic, well-founded and defensible projection. If

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16:02 1 that projection meets the limits of paragraph 15, then  
 2 so be it: Pakistan has to accept it. But unless India  
 3 proves that to be the case in the face of Pakistan's  
 4 protests, the pondage does not comply with  
 5 paragraph 8(c).  
 6 (Slide 15) Yesterday, very fairly to India,  
 7 Mr Minear -- at page 179, lines 1 to 19 -- put precisely  
 8 the position seen in P-0082 to Sir Daniel, and asked for  
 9 a series of bullet points as to why that position is  
 10 wrong. Professor Minear, I hope I have them captured  
 11 accurately for you on the slide. But very shortly,  
 12 they are as follows.  
 13 First, paragraph 15 is a limit on anticipated load,  
 14 it is not a substitute for it.  
 15 Second, India must establish its anticipated load as  
 16 realistic, well-founded and defensible, independently of  
 17 paragraph 15, by reference to actual evidence.  
 18 Third, a failure to justify, by India, anticipated  
 19 load in the face of Pakistan's protests will result in  
 20 the HEP being presumptively inconsistent with  
 21 paragraph 8(c).  
 22 However -- and this is the "however" I've kept  
 23 coming back to -- if India meets the applicable burden  
 24 with respect to anticipated load, Pakistan must  
 25 accept it.

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16:04 1 Now, yesterday the Chairman also asked me to  
 2 explain, with a little more granularity, how Pakistan  
 3 knows there is something wrong with India's plant  
 4 loading; that's page 136, line 24 to page 138, line 8.  
 5 And I gave the answer that you can tell by looking at  
 6 them. As we have seen from Pakistan's complaints in  
 7 various exhibits shown to you by Professor Webb  
 8 yesterday, fundamentally speaking, Pakistan's complaint  
 9 is that it considers the loading patterns deployed by  
 10 India to reflect an arbitrary set of peaking  
 11 requirements.  
 12 And they're arbitrary in two senses. The first is  
 13 one that the Court already has well in mind: they're not  
 14 evidenced. And so long as they remain unevidenced,  
 15 there are, by definition, not realistic, well-founded  
 16 and defensible; but they are, by definition, arbitrary.  
 17 (Slide 16) But beyond that, they are just a bit  
 18 weird. A good example is the 850 MW RHEP, the operating  
 19 pool calculations for which may be found at P-0077  
 20 (resubmitted).  
 21 Plotting the operations reflected on the relevant  
 22 one-pager produces the displayed loading pattern, which  
 23 has a number of features that, from an ordinary HEP  
 24 operation perspective, are decidedly strange.  
 25 First, from 8.00 am on Sunday to about midnight on

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16:05 1 Tuesday, we have a series of what I referred to  
 2 yesterday as triangle players. The RHEP is apparently  
 3 going to produce power for less than an hour a day at  
 4 exactly 7.00 pm.  
 5 Second, although things pick up a bit later in the  
 6 week, total generation time over the seven days is  
 7 13.25 hours total.  
 8 Third, the plant is producing only at its full  
 9 installed capacity, with no reference to the  
 10 requirements of turbine operation, such as the best  
 11 efficiency point in dry-season conditions.  
 12 Fourth, demand is not serviced on Monday, Tuesday or  
 13 Wednesday mornings, when it is actually needed, but the  
 14 HEP is peaked from 7.00 am to 8.00 am on Sunday, when  
 15 demand is low. But we must recall that that's of course  
 16 at the end of our paragraph 16 operational week, the  
 17 time at which all water received in the reservoir at the  
 18 end of the week must be below the dam.  
 19 Fifth, the HEP loading plan gives no account at all  
 20 for the fact that there is no variation between the  
 21 weekend and weekday demand for the Northern Region,  
 22 assuming as it does very little demand for Saturday and  
 23 Sunday.  
 24 Now, I take on board the Chairman's point that there  
 25 might be some reason why this particular HEP would need

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16:08 1 pretty cogent evidence would be required to credit that  
 2 India legitimately intends to tie up 2,182 MW of  
 3 generating capacity in this way, expanding, effectively,  
 4 the triangle section of the orchestra. And that goes  
 5 double when India is literally telling Pakistan, in the  
 6 exhibits we have looked at, that it is deliberately  
 7 designing its plants to meet the operating limits of  
 8 paragraph 15, with little regard to what the power  
 9 system actually requires.  
 10 Now, a further point on this. Professor Buytaert  
 11 made a valid observation about what India might say if  
 12 it was here, which is: well, what about all the Indian  
 13 HEPs without pondage? Does that not show that India is  
 14 not, in fact, "gaming" the system? That was page 141,  
 15 line 10.  
 16 And in response to that, I say that the pattern  
 17 we have seen is not necessarily consistent with India  
 18 deliberately set out to maximise pondage in order to  
 19 hurt Pakistan. What it does show is that when India is  
 20 minded to build a HEP with pondage, particularly  
 21 anything above about 300 MW, it is minded to maximise  
 22 its claimed entitlement to pondage by reference to  
 23 paragraph 15.  
 24 As Pakistan pointed out in the First Phase on the  
 25 Merits, India's HEP construction programme on the

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16:06 1 to be operated in this way, some unusual quirk of  
 2 the weather or grid mixture that would justify  
 3 a multi-billion-dollar piece of infrastructure sitting  
 4 idle for 155 hours a week with grid demand unmet. But  
 5 the idea that multiple plants need to be operated in  
 6 this way is perhaps a little difficult to accept.  
 7 (Slide 17) On the slide, we have every HEP with  
 8 pondage that India has notified for the Chenab above  
 9 Ramban since Baglihar. We analysed these in our  
 10 Post-Hearing Brief for the First Phase in Part B.2.  
 11 And it's basically the same as the RHEP. Kiru,  
 12 624 MW, and Kwar, 540 MW, produced for about 15 hours  
 13 a week; Miyar, 120 MW, for 17.5. The sole outlier, on  
 14 the bottom right-hand of the slide, is Lower Kalnai,  
 15 a mere 48 MW, which produces for 63.74 hours. But even  
 16 then, we still see our triangle players on Saturday and  
 17 Sunday, and it only produces at its installed capacity,  
 18 not the best efficiency point.  
 19 Now, as I've been at pains to point out, in  
 20 principle, Pakistan has no problem with any anticipated  
 21 load identified by India, provided that it's properly  
 22 evidenced. If the evidenced load checks out as  
 23 realistic, well-founded and defensible, then Pakistan is  
 24 bound to accept it.  
 25 But looking at this kind of generation pattern, some

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16:09 1 Western Rivers is immense. And rather than tailor that  
 2 construction to the needs of the HEP site and the  
 3 requirements of the Treaty, it prefers a plug-and-play  
 4 model, particularly on the Chenab Main: build a tall dam  
 5 with a deep spillway, incorporate a large operating pool  
 6 and move on, without worrying too much about what you  
 7 agreed in the Treaty.  
 8 So what might be ascribed by a suspicious mind to  
 9 malice on India's part can just as readily be explained  
 10 by other motives, and Pakistan does not mean in this  
 11 hearing to imply otherwise.  
 12 That's all I wanted to say about India's  
 13 methodology. One final point before I leave the topic.  
 14 The Chairman asked us about Pakistan's HEPs and  
 15 whether they demonstrate similar unusual operating  
 16 [patterns] to the designs we just looked at. That was  
 17 page 139, line 9 to page 141, line 9 as well.  
 18 The short answer, as I think Sir Daniel previewed  
 19 earlier, is that these HEPs are not governed by the  
 20 Treaty. But that notwithstanding, I am instructed that  
 21 they operate in a normal way, so in keeping with the  
 22 kinds of considerations that we have been discussing  
 23 these past two days.  
 24 (Slide 18) Now, we can get more data if you require  
 25 it, but the Court will recall on the site visit Mr Khan

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16:11 1 and Mr Malik gave us a snapshot of the peak's entire  
 2 power system on 23 December 2023, which was a Saturday.  
 3 This shows a far more normal mode of operation for  
 4 Pakistan's HEPs in the middle of the dry season.  
 5 I acknowledge it's only one day, it's not meant to be  
 6 representative of the whole, but this is as snapshot of  
 7 how the system ordinarily operates, as I understand it.  
 8 Now, we can see on the whole Pakistan's HEPs are  
 9 being used to provide a chunk of continuous power -- up  
 10 to 10% of total demand -- during the day, rather than  
 11 rapid spikes at seemingly random times. And down at  
 12 the very bottom of the graph, we see our old friend, the  
 13 Neelum-Jhelum HEP, chugging along at the bottom and  
 14 producing intermediate power for about 19 hours in the  
 15 day, consistent with Dr Morris's analysis that these  
 16 plants aren't necessarily suitable for peaking during  
 17 the dry season.  
 18 So that's India's case.  
 19 (Slide 19) Before finishing, I wanted to address one  
 20 hanging point, which is the Chairman's question on  
 21 e-flow. That is page 174, line 14 to page 179, line 9.  
 22 And essentially there the question was: first, whether  
 23 the fact that the KHEP was a result diversion work under  
 24 paragraph 15(ii) alters our appreciation of e-flow; and  
 25 second, whether concerns about e-flow downstream are

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16:12 1 addressed in the context of a HEP itself, or whether  
 2 there is some kind of re-regulation of operations  
 3 downstream that could do the job.  
 4 In light of the time remaining, I hope to answer  
 5 this quite quickly.  
 6 But as to the first point, both a diversion work and  
 7 a regular HEP have the potential to cause significant  
 8 environmental damage. If you have a diversion work,  
 9 the natural riverbed may be left completely dry. But if  
 10 you have a regular HEP with pondage, without e-flow,  
 11 you may have a riverbed below the plant that is left dry  
 12 for most of the day -- as many as 20 hours if the HEP is  
 13 being operated in a very abrupt peaking operation -- and  
 14 that riverbed will then receive an ordinary dry-season  
 15 day's worth of water in a very short space of time.  
 16 Both operations can cause significant environmental  
 17 damage, and so the appreciation of how e-flow may differ  
 18 in each case may be one of degree only. As we said in  
 19 the Memorial and as I said from this podium yesterday,  
 20 this really is a case-by-case analysis.  
 21 As to the second part of the question, as to whether  
 22 downstream re-regulation has a role to play here  
 23 independently of HEP operations, one can see how that  
 24 might be possible, especially if such re-regulation  
 25 classified as a non-consumptive use by India within

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16:14 1 the meaning of Articles I(11) and III(2)(a) of the  
 2 Treaty proper. Of course, claims by India to such use  
 3 would need to be carefully scrutinised by Pakistan.  
 4 But the short answer is that HEP operation is the  
 5 easiest way to guarantee e-flow both immediately below  
 6 the plant and beyond. It is what the Kishenganga Court  
 7 seems to have had in mind, and it is certainly the way  
 8 that India approaches the question in its pondage  
 9 calculations, as we have seen. We also have to bear in  
 10 mind that the closer the HEP gets to the border of  
 11 Pakistan proper and Azad Kashmir, the less the capacity  
 12 for India to actually engage in that re-regulation  
 13 beyond the HEP itself.  
 14 And the final point that tips the balance, in  
 15 Pakistan's submission, is once more that of data.  
 16 Maintenance of the health of the Indus Basin is critical  
 17 to Pakistan, and is reflected in the let-flow  
 18 obligations of Article III. The further upriver the  
 19 HEP, the harder it is for Pakistan to actually ensure  
 20 that India is acting as a good steward of the  
 21 Western Rivers.  
 22 If e-flow existed independently of HEP operations,  
 23 India would have no obligation to keep Pakistan apprised  
 24 of the impact of its HEPs on flows beyond the border or  
 25 the line of control, as appropriate. Once incorporated

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16:15 1 into HEP operations, India's obligation to notify  
 2 Pakistan of e-flow is incorporated into paragraph 5(a)  
 3 of Appendix II, which requires India to specify the  
 4 "[e]stimated effect of a proposed development on  
 5 the flow pattern below the last plant downstream (with  
 6 details of estimation)".  
 7 Members of the Court, unless you have any further  
 8 questions, those are my submissions.  
 9 THE CHAIRMAN: Dr Miles, I have just a couple of questions  
 10 for you.  
 11 First of all, let me say that I greatly appreciated  
 12 your connecting the presentation to the questions put  
 13 yesterday. It's extremely helpful on our end to see  
 14 where it is you're responding to points that we raised.  
 15 So one point raised yesterday as a question -- but  
 16 I think you answered it, and I just want to be sure  
 17 I understand Pakistan's position -- I think it was  
 18 a question by Professor Buytaert, and I don't have  
 19 the citation to the transcript from yesterday, but it  
 20 was along the lines of: in the context of installed  
 21 capacity, you indicated to us certain hypothetical ways  
 22 that one might be so-called "gaming the system". And  
 23 the question was along the lines of: is there anything  
 24 in the record to show us that India has built  
 25 Annexure D.3 HEPs in a manner where the installed

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16:17 1 capacity is too large, and basically not justified by  
 2 the hydrology of the river?  
 3 My impression was you said: there's nothing specific  
 4 in the record that you're calling our attention to.  
 5 Is that a correct understanding of where we are?  
 6 DR MILES: That is correct, sir, yes.  
 7 THE CHAIRMAN: Okay.  
 8 My second question perhaps will lead into what  
 9 Professor Webb is going to speak to us about. But from  
 10 what I've heard so far, in grappling with this issue of  
 11 potential -- I'll call them "extraordinary events" that  
 12 might lead one to design a HEP in a manner that departs  
 13 from what would be a typical load curve in the dry  
 14 season, it feels like I've heard three different  
 15 theories about how that should be addressed.  
 16 One theory -- maybe I'll call it the "Morris  
 17 theory" -- is that HEPs of this kind are inherently  
 18 low-peaking, unpredictable-peaking, such that they  
 19 aren't really available for those extraordinary events,  
 20 or at least you wouldn't design a HEP to address such  
 21 events. And therefore perhaps -- he didn't say this;  
 22 I'm extending the Morris theory to something further --  
 23 but perhaps the Treaty is not attempting to take that  
 24 into account.  
 25 A second possible theory -- I'll call it the "Rae

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16:20 1 or at least the version of extraordinary events that  
 2 I put forward. Mr Rae was talking about things like  
 3 extraordinary events within the power system itself, so  
 4 a rapid outage that would require use of spinning  
 5 reserve, or something of that character. My  
 6 understanding of "extraordinary events" was a radical  
 7 change in the operation of the entire grid that is far  
 8 more enduring than that.  
 9 And so the Rae theory and the Miles theory -- terms  
 10 I adopt without prejudice -- are the same theory in the  
 11 sense that they are both based around paragraph 2(c).  
 12 Now, paragraph 2(c) is the engine room for the  
 13 concept of daily and weekly loads on the plant. In  
 14 a daily and weekly load on the plant situation, you're  
 15 not going to expect every single day for there to be  
 16 an immediate need for spinning reserve, or something  
 17 a little more remarkable along those lines, which is,  
 18 I believe, the point that Mr Rae was making.  
 19 In his view, "daily and weekly loads on the plant"  
 20 means just that: the kind of ordinary daily and weekly  
 21 load on the plant that you would expect in ordinary  
 22 operation, because that's what paragraph 2(c) requires.  
 23 You are modelling the pondage on the ordinary load  
 24 curve; not by reference to spinning reserve, not by  
 25 reference to sediment management or any other kind of

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16:19 1 theory" -- is that these extraordinary events are being  
 2 accounted for in the Treaty by the "times 2" aspect of  
 3 the pondage calculations. In other words, at the front  
 4 end of thinking through things like load and installed  
 5 capacity, one doesn't take those into account because  
 6 they're picked up at a later part in the analysis.  
 7 The third theory -- I'll call it the "Miles  
 8 theory" -- is that: yes, it is possible for these  
 9 extraordinary events that are contemplated by a designer  
 10 at the outset to be taken into account in the design,  
 11 but India must explain why those factors are being  
 12 advanced and provide sufficient evidence to Pakistan  
 13 about such events. And then it's a question of whether  
 14 Pakistan looks at the material and says, "This is  
 15 reasonable", or says, "It's unreasonable", and one moves  
 16 forward from there.  
 17 It may be that these three theories are not  
 18 necessarily conflicting. But I just have them bouncing  
 19 around in my head right now, and I'm wondering if you  
 20 have any thoughts that might settle them down for me.  
 21 DR MILES: Let me try and assist you, Mr President, by  
 22 making the radical proposition: these are, in point of  
 23 fact, all the same theory.  
 24 Now, Mr Rae's theory about extraordinary events is  
 25 different to my understanding of extraordinary events,

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16:22 1 arrangement. And that's why he says the buffering is  
 2 taking place in the "times 2" arrangement.  
 3 So the Miles theory and the Rae theory are the same  
 4 thing.  
 5 The Morris theory fits into this, because it feeds  
 6 into the understanding of what the daily and weekly load  
 7 of the plant actually is. And Dr Morris, as  
 8 I understand -- and I'm not going to try to put words in  
 9 the engineer's mouth -- was simply pointing out that  
 10 when you're figuring out your daily and weekly load, the  
 11 availability of peaking, serious peaking power, may not  
 12 be as propitious as you may otherwise wish. Which is  
 13 why we see plants like the Neelum-Jhelum HEP running as  
 14 an intermediate plant, because that's sort of where  
 15 it would fit in the load curve to make it a reliable  
 16 source.  
 17 So that's my rather long-winded answer to the three  
 18 theories, and I hope it satisfies the thoughts in your  
 19 brain.  
 20 THE CHAIRMAN: It has settled down those bouncing-around  
 21 thoughts a bit, so I thank you for that.  
 22 I don't believe we have any other questions for you,  
 23 in which case all that remains is for me to thank you  
 24 very much for your very helpful presentation. We do  
 25 appreciate it.

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<p>16:23 1 And I believe that the next speaker will be 2 Professor Webb. So when she is ready, please approach 3 the podium. Thank you. 4 DR MILES: Thank you. 5 PROFESSOR WEBB: (Slide 2) Mr Chairman, members of 6 the Court, I will address questions arising from my 7 presentation yesterday, which fall into three 8 categories: first, the object and purpose of the Treaty, 9 and constraints on India imposed by the Treaty; second, 10 the Treaty framework relevant to the constraints on 11 India, regarding installed capacity and anticipated 12 load, and the basis in historic practice; and third, 13 some specific questions on the practice regarding 14 the Northern Region Grid. 15 (Slide 3) Professor Minear made the very important 16 point yesterday on what India might argue, and that's at 17 transcript page 102, line 3 to page 104, line 9. And 18 there were two points that he made. 19 First, that India might argue that the primary 20 purpose of the Treaty is to obtain "the most complete 21 and satisfactory utilisation of the waters of the Indus 22 system", and that this purpose would be best served by 23 allowing India broad flexibility in installing pondage, 24 subject only to the Treaty requirements, and that it 25 calculate firm power based on the MMD, and comply with</p> <p style="text-align: center;">Page 109</p>	<p>16:26 1 in paragraphs 427 to 428 of its General Issues Award, 2 noting that this phrase of "complete and satisfactory 3 utilisation of the Indus system of rivers" is 4 "an element of the object and purpose", but it has to be 5 understood "in a way that is satisfactory to both the 6 upstream riparian (dominantly India) and downstream 7 riparian (dominantly Pakistan)". So "a complete and 8 satisfactory utilization of the waters", the Court said, 9 "of the Indus system of rivers is only possible by 10 establishing a stable and well-defined set of rights and 11 obligations of both riparians". 12 And the Court usefully noted what is not the object 13 and purpose of the Treaty, which is that: 14 "[It] does not provide for the maximum development 15 of the resources of the Indus system of rivers by one 16 Party or the other." 17 Neither Party secures, through the Treaty, 18 unilateral or exclusive rights to use or develop 19 the Indus system. 20 So, in short, on the object and purpose, the use of 21 the Indus system of rivers is part of the Treaty bargain 22 that I mentioned yesterday: that to achieve that 23 "complete and satisfactory utilisation", the Treaty has 24 allocated the Eastern Rivers to India and the Western 25 Rivers to Pakistan. Now, that allocation on the Western</p> <p style="text-align: center;">Page 111</p>
<p>16:24 1 the release requirements at paragraph 15 of Annexure D. 2 Now, the aspect of that part of the proposed case, 3 on MMD and paragraph 15, has already been addressed by 4 Dr Miles. But I'll come back to the first part on the 5 object and purpose, and what that means for flexibility. 6 But the second point that Professor Minear raised 7 was that India, if it was here, might point out that: 8 "... the existence of a regional grid encompassing 9 many HEPs provides that no single HEP needs to conform 10 to the regional grid requirements but rather to operate 11 in tandem with the other HEPs, to give [again] India 12 maximum flexibility in meeting anticipated loads." 13 I gave an initial answer on the object and purpose 14 point, which is at transcript page 103, lines 20 to 25, 15 and I'll elaborate on that now. 16 The phrase "the most complete and satisfactory 17 utilisation of the waters of the Indus system" appears 18 in the preamble to the Treaty, and India has indeed 19 argued in previous fora that this is the object and 20 purpose. They have argued that in the Permanent Indus 21 Commission, in the Kishenganga proceedings and in the 22 Baglihar Neutral Expert proceedings, and this is noted 23 in the General Issues Award of this Court at 24 paragraph 408. 25 (Slide 4) The Court directly addressed this argument</p> <p style="text-align: center;">Page 110</p>	<p>16:27 1 Rivers has a hydropower exception for India, but that is 2 subject to Pakistan's right to the unrestricted use of 3 the waters. 4 And it is in this context and it is for this purpose 5 that Annexure D restricts the permissible volume of 6 pondage and pegs the limit to power generation at the 7 minimum mean discharge. And this was held by the 8 Kishenganga Court in its partial award at paragraph 504, 9 which was cited by this Court in paragraph 433 of its 10 General Issues Award. 11 On the second aspect of a potential argument by 12 India based on the regional grid -- and this has been 13 dealt with from an engineering and also legal 14 perspective by my colleagues before me, but looking at 15 it through the lens of the object and purpose -- India 16 must let flow the waters of the Western Rivers for 17 Pakistan's unrestricted use, and a theory of grid 18 optimisation or grid maximum flexibility cannot prevail 19 over Article III of the Treaty or the plant-specific 20 design criteria in Annexure D, Part 3. 21 I recall that each Annexure D.3 HEP is notified to 22 Pakistan on an individual basis. If the regional grid 23 is to allow India to meet demand flexibly, that just 24 shows that the system can use what capacity exists; 25 it does not justify creating capacity, and certainly not</p> <p style="text-align: center;">Page 112</p>

16:29 1 in disregard of the Treaty's structure and object.  
 2 Turning to the Treaty framework, Mr Chairman,  
 3 you asked me what factors led Pakistan to conclude,  
 4 based on the data received or not received under  
 5 paragraph 9 and Appendix II, that India's load curve was  
 6 hypothetical; you asked for the touchstones in this  
 7 regard. And that's at transcript page 72, line 14 to  
 8 page 74, line 8. Dr Miles has addressed this in front  
 9 of me perspective of what is flawed in India's case, and  
 10 I am addressing it from the perspective of historic  
 11 practice.  
 12 (Slide 5) Going through the correspondence,  
 13 the data, the discussions, we can start to identify  
 14 these touchstones. Now, I must say: these are based on  
 15 the correspondence, this non-exhaustive list, but these  
 16 are the factors that have come out through that historic  
 17 practice of why Pakistan has said that India is  
 18 presenting a hypothetical load curve.  
 19 So Pakistan has explained to India that the  
 20 calculation for the operating pool did not depict the  
 21 actual variations through the turbines. This was in  
 22 relation to the Lower Jhelum and the Chinani-II HEPs.  
 23 India did not appear to intend to operate the plant  
 24 as it proposed in relation to Lower Jhelum.  
 25 The expected power output was arbitrarily assumed;

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16:30 1 it wasn't in a reasonable relationship to the expected  
 2 output of the plant.  
 3 And there was sort of a key overarching point here,  
 4 and we've seen it in the other presentations today:  
 5 there is an arbitrary peaking schedule, with a lack of  
 6 a clear basis for selecting the timing of operations on  
 7 the various days of the week and a lack of a basis for  
 8 depletion of the stored water. And that is in relation  
 9 to Kishenganga and Ratle.  
 10 (Slide 6) And for your record, what the previous  
 11 slide did was draw out the themes of the correspondence.  
 12 This is the underlying correspondence for these factors.  
 13 Another factor evident on the historic record is the  
 14 form of India's provision of data, not just its  
 15 substance. Pakistan often could not assess whether  
 16 a curve was realistic and well-founded because India  
 17 simply did not provide sufficient evidence of its actual  
 18 anticipated load or outright denied that such data was  
 19 required to be provided.  
 20 (Slide 7) So looking at it from the perspective of  
 21 not just unclear or arbitrary information but missing  
 22 information, over the historic practice, Pakistan has  
 23 pointed to missing figures for minimum mean discharge,  
 24 missing calculations for the actual operation of the  
 25 HEP, missing calculations for the capacity of the

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16:32 1 operating pool and a lack of supporting basis for the  
 2 calculations of pondage in the computation method.  
 3 (Slide 8) And as before, the underlying documents  
 4 are there for your record from the exchanges between  
 5 the Parties.  
 6 Mr Chairman, you also asked about the references to  
 7 paragraphs 8(a) and (b) in paragraph 3.30 of the  
 8 Memorial; that's at transcript page 104, line 10 to  
 9 page 105, line 2. And you asked: what implicit limits  
 10 on installed capacity and anticipated load arise from  
 11 these provisions?  
 12 (Slide 9) So looking first at 8(a). In the General  
 13 Issues Award, the Court said that the term "the works",  
 14 which is at the beginning of paragraph 8(a), [is]:  
 15 "... intended to cover all aspects of the  
 16 engineering works [that is, of the plant] as a whole, as  
 17 well as [the] individual components of a plant."  
 18 So no aspect of an Indian HEP design constrained by  
 19 paragraph 8(a) may be deployed to allow for the filling  
 20 of that HEP's operating pool above full pondage level,  
 21 and the Court said:  
 22 "... through human intervention, rather than  
 23 occurrences arising from nature, such as flooding ... or  
 24 waves caused by winds."  
 25 And that's at paragraphs 765 and 767 of the General

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16:33 1 Issues Award.  
 2 So installed capacity and load projections must be  
 3 such that the HEP can meet them without an artificial  
 4 elevation of the operating pool.  
 5 When it comes to paragraph 8(b), this requires the  
 6 design of the works to take account of the requirements  
 7 of secondary power, which is of course in addition to  
 8 firm power, and it is therefore, in Pakistan's  
 9 submission, implicitly reinforcing the formulation in  
 10 paragraph 8(c) that pondage is "required for Firm  
 11 Power".  
 12 The next point relates to paragraph 17, and this was  
 13 at transcript page 105, lines 3 to 17.  
 14 Now, as you know, paragraph 17 says:  
 15 "In applying the provisions of Paragraph 15:  
 16 "... a tolerance of 10% in volume shall be  
 17 permissible ..."  
 18 And I was asked about the significance of that 10%  
 19 tolerance for determinations in this phase.  
 20 Paragraph 17 is not relevant to the calculation of  
 21 pondage. It is a provision for when, in narrow  
 22 circumstances, India cannot keep within the operational  
 23 limits of paragraph 15. It is conditional, it is  
 24 situational; it cannot be used to justify a higher  
 25 installed capacity or an ambitious anticipated load

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16:35 1 projection. And I would note that even India has not  
 2 invoked paragraph 17 in its pondage calculations.  
 3 Mr Chairman, you asked about Pakistan's position on  
 4 India's repeated failure to provide calculations or data  
 5 relating to firm power or secondary power, and whether  
 6 they respected the breakdown between those two concepts.  
 7 And that was at transcript page 67, line 16 to page 68,  
 8 line 16.  
 9 The first point is that Pakistan does still regard  
 10 the notification requirements in the Treaty as including  
 11 the breakdown in capacity between firm power and  
 12 secondary power. This is said in terms in  
 13 paragraph 4(i) of Appendix II, as well as Appendix III  
 14 of Annexure D and the appendix to Annexure E. We can't  
 15 read this requirement and we should not read this  
 16 requirement out of the Treaty. It is also stated by the  
 17 Court at paragraph 742 of the General Issues Award.  
 18 The historic practice may emphasise this, especially  
 19 in the early years, because Pakistan's case on pondage  
 20 was tied to firm power, making it important to know  
 21 which power units were being reserved for firm power as  
 22 opposed to secondary power. And I showed you yesterday  
 23 from 1993, in the context of the Thiroth HEP, the  
 24 Pakistan Commissioner's clear explanation of this, and  
 25 that's at the transcript at page 67, lines 3 to 15.

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16:38 1 load, and you see this in his statement S9 (PLA-0002)  
 2 that refers in the last paragraph to his concern.  
 3 He said:  
 4 "The pondage calculation presented by India is done  
 5 with the object of operating the plant with a constant  
 6 river inflow, while regulating the fluctuations in  
 7 power. The [Neutral Expert] agrees with the principle,  
 8 but not with the hypothesis concerning the time peak  
 9 load hours on which the calculations should be based;  
 10 this is not clearly justified."  
 11 And at page 104 of the same determination, he noted  
 12 that the determination of the time of the peak load  
 13 during each day should be based on a forecast of the  
 14 power demand of 15 or 20 years in the Northern Region.  
 15 Now, Mr Chairman, you asked us to go beyond  
 16 the determination, and we have. We've looked back at  
 17 various meeting transcript to try to indeed identify the  
 18 factors in the mind of the Neutral Expert in reaching  
 19 this conclusion in the final paragraph of statement S9.  
 20 These are on the record in BR-0031, which is the  
 21 meeting transcript from 27 May 2006. India made the  
 22 argument that in India there are no "real load curves"  
 23 because of energy shortages and they just provide  
 24 a "managed demand curve". That's at page 89 of that  
 25 transcript. Pakistan's Secretary, Mr Mahmood, noted at

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16:37 1 Following the Court's General Issues Award,  
 2 installed capacity and anticipated load must reflect how  
 3 the HEP will actually be operated, for which Pakistan  
 4 submits this distinction is still relevant.  
 5 (Slide 10) Mr Chairman, you asked about the meaning  
 6 of the words "exclusive of standby units" in  
 7 paragraph 4(i) as well as other provisions of  
 8 the Treaty, and that's at transcript page 94, lines 2  
 9 to 21.  
 10 The ordinary meaning is: power units that act as  
 11 backups for outages or maintenance. And because these  
 12 standby units are excluded by paragraph 4(i), they do  
 13 not count towards the maximum aggregate capacity for  
 14 planning purposes. They are intended to preserve  
 15 availability, but not to increase the overall output.  
 16 I now come to a question of Treaty application,  
 17 rather than interpretation, and this was a question  
 18 about the factors that the Baglihar Neutral Expert might  
 19 have had in his mind when he adjusted the pondage level  
 20 that was originally proposed by India and which he found  
 21 to be excessive. And this was at transcript page 85,  
 22 lines 2 to 25.  
 23 (Slide 11) Monsieur Lafitte reduced India's proposed  
 24 pondage because he did not accept India's peak hour  
 25 hypothesis as a credible representation of anticipated

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16:40 1 pages 72 to 73 that:  
 2 "... the calculation of the maximum Pondage is  
 3 site-specific and is not to the discretion of what peak  
 4 load, [or] what peak capacity, one would like to have."  
 5 So that was the initiation of the discussion on this  
 6 point that we then see reflected in statement S9. There  
 7 was further discussion in BR-0032, BR-0034, BR-0035 and  
 8 BR-0038.  
 9 (Slide 12) Let me just take you to BR-0034. This is  
 10 the meeting of 2 October 2006 at page 125. And these  
 11 are the words of the Neutral Expert in response to  
 12 India:  
 13 "... I cannot agree with the calculation [presented  
 14 by India] because the peak loads hour[s] which were  
 15 chosen by India are not very logical ... [and] are  
 16 chosen to [attain] the largest pondage. Just suddenly  
 17 on Wednesday you are producing during some hours and not  
 18 during other hours ... it is not acceptable. So the  
 19 principle is right but not the result of the  
 20 calculation."  
 21 The next day, on 3 October, which is in BR-0035 at  
 22 pages 167 to 168, instead of Wednesday, the Neutral  
 23 Expert noted that the Indian diagram for the HEP  
 24 suddenly had no production at 8.00 am, and then resuming  
 25 again at noon, and then also expressed how he could not

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16:41 1 agree or understand this.  
 2 (Slide 13) And then, when presented with his draft  
 3 determination, India's representative commented on the  
 4 specific paragraph in statement S9, saying that the  
 5 wording shows India "in a very, very bad light" and  
 6 they were not happy with it. And that's at page 209 of  
 7 BR-0038.  
 8 So tracing that through to how it was finally  
 9 expressed and justified the reduction in pondage, it was  
 10 India's arbitrary peaking schedule, which has been  
 11 a constant concern of Pakistan over the decades, that  
 12 was the key factor in the mind of the Neutral Expert  
 13 during the Baglihar determination.  
 14 (Slide 14) I now come to two questions related to  
 15 the power grid, and these arise from the correspondence.  
 16 We've heard a lot about the power grid from the  
 17 perspective of engineering and law from previous  
 18 speakers.  
 19 Professor Minear asked at transcript page 68,  
 20 line 17 to page 69, line 11 whether earlier HEPs, like  
 21 Stakna, were added to the local grid, rather than the  
 22 regional grid, at the time they were planned and  
 23 constructed. And the answer, in particular to Stakna,  
 24 is: yes, they were added to the local grid, the Leh  
 25 grid, and only connected to the Northern Regional Grid

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16:43 1 much later. In the case of Stakna, it wasn't until  
 2 2019. And the Northern Regional Grid of course was  
 3 connected to the Central Grid in August 2006, as  
 4 I mentioned yesterday.  
 5 The reason for this is that the HEPs that are in the  
 6 Indus Basin are more remote, much more difficult  
 7 locations compared to the Jhelum or the Chenab, so they  
 8 have historically taken longer to connect to the  
 9 Northern Grid.  
 10 This information is on the record, looking at  
 11 Pakistan's First Phase Memorial in these proceedings, at  
 12 Appendix C1, which gives the locations of every  
 13 Annexure D.3 HEP. And that can be cross-referenced, to  
 14 an extent, with public information on grid connection.  
 15 But for completeness, I recall my point yesterday  
 16 that the understanding of "anticipated load" has to be  
 17 calibrated to the grid as it is today. And that was  
 18 a point I made at transcript page 93, line 17 to  
 19 page 96, line 19.  
 20 Mr Chairman yesterday -- at transcript page 105,  
 21 line 19 to 107, line 23 -- asked in relation to this  
 22 slide (14), which was my slide 33 from yesterday, if  
 23 India had provided information on the national grid or  
 24 whether Pakistan had access to that information  
 25 independently.

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16:44 1 We've confirmed that India did not provide grid data  
 2 to Pakistan. From Pakistan's perspective, prior to the  
 3 General Issues Award, such data was only relevant to  
 4 Baglihar, following the Neutral Expert determination.  
 5 The data is available for certain years. You've  
 6 heard from Dr Miles that we've pulled seven years of  
 7 data. Of course, this is under India's control and  
 8 it could be pulled down if it chose to do so.  
 9 And I recall what Mr Rae has said today, but also  
 10 yesterday -- which was at transcript page 257, lines 6  
 11 to 17 -- that in order for Pakistan to understand the  
 12 role of the HEP in the broader grid, it would not be  
 13 realistic to look at the isolated distribution system  
 14 and say that this plant does everything in that system.  
 15 Pakistan has to understand how the HEP is part of the  
 16 integrated load in the system, how it actually operates,  
 17 and this of course is taken into account in determining  
 18 the pondage required.  
 19 That concludes my responses to the questions,  
 20 Mr Chairman.  
 21 THE CHAIRMAN: Thank you very much, Professor Webb.  
 22 Professor Minear?  
 23 PROFESSOR MINEAR: Thank you, Professor Webb, for that very  
 24 helpful discussion. I have one question relating to  
 25 terminology, and perhaps you can help me with this.

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16:46 1 We make reference to load curves, and in the  
 2 dispositif, it might be a term that is used. But  
 3 I worry that it might have an unnecessarily narrow  
 4 understanding, in terms of being a graphic  
 5 representation of power demand. And I wonder, in terms  
 6 of using that term, whether there's a better term that  
 7 could be used to more accurately describe the  
 8 information that Pakistan would seek with regard to  
 9 power demand.  
 10 PROFESSOR WEBB: I'm not sure if my engineering background  
 11 that I've acquired during this case is sufficient to  
 12 answer that question.  
 13 From a practical point of view, often what we call  
 14 the "load curve" has been provided in tabular form.  
 15 PROFESSOR MINEAR: Exactly.  
 16 PROFESSOR WEBB: Exactly. But I don't know if there's  
 17 a better term that would capture that, that would still  
 18 have an ordinary meaning that's not importing things  
 19 that would unintentionally expand or contract the  
 20 meaning.  
 21 PROFESSOR MINEAR: Okay. Well, I hope perhaps Pakistan can  
 22 reflect on that --  
 23 PROFESSOR WEBB: Mm-hm.  
 24 PROFESSOR MINEAR: -- because if that term is used, we want  
 25 to make sure that the term has a clear understanding for

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16:47 1 the Parties, both Pakistan and India.  
 2 PROFESSOR WEBB: Yes.  
 3 THE CHAIRMAN: So, Professor Webb, I just have a very  
 4 general question for you; any reflections you have in  
 5 response I would find helpful. And it relates somewhat  
 6 to a question I asked yesterday about interpretation of  
 7 the Treaty over time.  
 8 We do have a Treaty dating back to 1960 that was  
 9 enacted at a time when the Western Rivers HEPs that  
 10 existed and were contemplated were relatively local in  
 11 nature, and not connected to a regional or  
 12 national grid. By contrast, today, based on the  
 13 presentations Pakistan has made, it's quite clear it's  
 14 a different world in many respects.  
 15 My impression is that Pakistan accepts the  
 16 proposition that one should not be interpreting the  
 17 Treaty today to impose constraints based on the way the  
 18 HEPs might have operated in 1960; that Pakistan accepts  
 19 that India would be designing HEPs that are fit for  
 20 purpose today, in the situation that it now has with its  
 21 regional and national grid.  
 22 I assume that's correct based on the fact that you  
 23 have presented to us data regarding the regional grid,  
 24 that you have presented to us information about the way  
 25 these HEPs might operate in relation to other HEPs and

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16:50 1 Kishenganga Court previously [accepted] and as this  
 2 Court accepted in its General Issues Award, taking that  
 3 context, taking the type of Treaty, taking its object  
 4 and purpose, where you have developments like  
 5 state-of-the-art technology, that absolutely should be  
 6 taken into account in interpreting and applying the  
 7 Treaty, as long as it's in the service of the Treaty and  
 8 not displacing the Treaty.  
 9 So now coming out of the General Issues Award, we  
 10 have this notion of the actual operation of the HEP.  
 11 Of course that has to be as it is today, and not as it  
 12 was in the 1960s. But we're just saying that's always  
 13 within the framework and the object and purpose of  
 14 the Treaty.  
 15 THE CHAIRMAN: And that seems consistent with Pakistan's  
 16 position -- expressed, I think, by Sir Daniel, or  
 17 perhaps it was Dr Miles, but I think it was  
 18 Sir Daniel -- that when we're thinking about the  
 19 information to be provided, we aren't trapped in what  
 20 information might have been expected in 1960 --  
 21 PROFESSOR WEBB: Exactly.  
 22 THE CHAIRMAN: -- instead, it's the information that's  
 23 relevant today. Is that correct?  
 24 PROFESSOR WEBB: Yes. Yes, correct.  
 25 THE CHAIRMAN: Very good. I think that exhausts our

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16:49 1 so on.  
 2 But I just wanted to make sure that that was  
 3 the basic approach that Pakistan is taking:  
 4 an acknowledgement that we take the Treaty, the language  
 5 within the Treaty; yes, it was crafted at a particular  
 6 time when particular facts might have existed for the  
 7 way these HEPs were expected to fit within the power  
 8 system, and we yet need to apply that today, based on  
 9 the facts of what we now have in the power system.  
 10 Is that generally the way that Pakistan is  
 11 approaching the case?  
 12 PROFESSOR WEBB: Yes, Mr Chairman. I mean, I think it is  
 13 nuanced, but I think it is as you have presented it.  
 14 And just to go back to the General Issues Award,  
 15 where this was quite a discussion, not in the context of  
 16 the grid now and then, but in a broader approach to  
 17 the Treaty.  
 18 So this is a very special type of Treaty, as the  
 19 Court has recognised. It's akin to a boundary treaty.  
 20 It is underpinned by three bargains, including a bargain  
 21 regarding peace. And that means it's not easily to be  
 22 expansively or teleologically interpreted, because it  
 23 was meant to resolve something for all time, as things  
 24 stood at the time.  
 25 But as Pakistan submitted, and as both the

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16:51 1 questions for you.  
 2 PROFESSOR WEBB: Thank you very much.  
 3 THE CHAIRMAN: Thank you very much, Professor Webb. It was  
 4 very helpful. Again, like with Dr Miles, it was  
 5 particularly useful to connect your responses to the  
 6 particular questions that we had yesterday, so we're  
 7 very grateful.  
 8 PROFESSOR WEBB: Thank you. And I would ask, Mr Chairman,  
 9 that you call Sir Daniel back to the podium.  
 10 THE CHAIRMAN: Very good.  
 11 In that case, Sir Daniel, we will now hear from you.  
 12 We are getting close to the so-called witching hour.  
 13 But I said before, it's not a true hard deadline, so do  
 14 take the time you feel you need, and we will adjust  
 15 accordingly.  
 16 SIR DANIEL: Thank you, Mr Chairman.  
 17 Mr Chairman, I note that I'm going to be very brief.  
 18 So we may go beyond the witching hour, but you will have  
 19 to address the Attorney General in the witching space.  
 20 Mr Chairman, there's just one observation perhaps,  
 21 in response to the last question that you put to  
 22 Professor Webb, and that's in complete agreement with  
 23 what she's just said, but just to, having discussed with  
 24 the Attorney General, just to make a point absolutely  
 25 clear.

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16:53 1 There was a further question that you put to  
 2 Professor Webb about -- or that Professor Minear put to  
 3 Professor Webb about the use of the load curve, and  
 4 which Professor Webb quite properly said that she's  
 5 going to have to consult with our engineering  
 6 colleagues.  
 7 I will come in just a moment to an aspect of our  
 8 final submissions which may touch upon this. I just  
 9 want to make sure that before the final submissions are  
 10 read, that we don't lose an opportunity to come back to  
 11 you, Professor Minear, on this point, because we are not  
 12 going to be inviting the Court to propose post-hearing  
 13 briefs. But I just want to make sure that if there is  
 14 a lingering question, that it is answered while there is  
 15 still an opportunity to answer it.  
 16 But let me, Mr Chairman, just make an observation  
 17 about temporal issues which you put to Professor Webb,  
 18 and if I see a clattering bottle on the floor or a wave  
 19 of the hand, then I will know that I am speaking beyond  
 20 my competence and beyond my brief.  
 21 I think there are a number of aspects about this  
 22 temporal dimension enquiry that are very important and  
 23 very sensitive and we need to get absolutely correct.  
 24 The Treaty was a bargain in 1960 which contains, as  
 25 Professor Webb has already drawn to your attention,

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16:56 1 very helpfully brought to bear, you did also take the  
 2 view that where there were defined concepts, those  
 3 defined concepts had to be interpreted through the lens  
 4 of the understanding of the Parties at the time. And  
 5 you went back, in the footnotes in your Award, to some  
 6 of the hydropower texts of the 1950s in order to give  
 7 specific content to the meaning of those terms.  
 8 Now, those terms also are not evolutionary terms  
 9 because those are the terms around which the bargain  
 10 coalesced. So there is no evolution in those terms.  
 11 That said, there are elements expressly in the  
 12 Treaty which are not defined terms and do contemplate  
 13 the possibility of looking at the interpretation and the  
 14 application of the Treaty through the present lens, and  
 15 we have addressed these, and indeed Professor Webb  
 16 addressed these in some detail in the Hearing on the  
 17 First Phase.  
 18 When you have a look at paragraphs 8(d), 8(e) and  
 19 8(f), where there is the discussion or the reference to  
 20 "sound and economical design and satisfactory  
 21 construction and operation of the works", for example,  
 22 that obviously has to be looked at through the prism of  
 23 what is sound and economical and satisfactory with  
 24 current technology. And you will recall very clearly  
 25 that it is Pakistan's absolutely affirmative position

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16:54 1 those three bargains that you addressed in the first  
 2 award: the peace bargain, the treaty bargain and the  
 3 hydro bargain. And those bargains had a quid pro quo:  
 4 Pakistan got the use of the waters of the Western  
 5 Rivers, India got the use of the waters of the  
 6 Eastern Rivers.  
 7 Now, India has been exercising, and continues to  
 8 exercise, its Treaty rights under the Eastern Rivers, we  
 9 say exorbitantly, but that's not for these proceedings,  
 10 but in such a way as those Eastern Rivers, in periods of  
 11 the year, are completely run dry because of the way in  
 12 which India uses the waters of the Eastern Rivers.  
 13 It cannot be that a process of looking at the Treaty  
 14 in 2026 in a sense unpicks in some shape or form that  
 15 very intricate and politically fraught bargain.  
 16 Now, I'm not anticipating, Mr Chairman, that this  
 17 was at all in your mind when you asked the question.  
 18 But I think I need to put on the record that this, from  
 19 Pakistan's perspective, save in respect of one point to  
 20 which I will come, is not an -- I think the word you  
 21 used was "an evolutive treaty". This is akin to  
 22 a boundary treaty, that was the language that you used,  
 23 it was fixed in time, and the bargain does not change.  
 24 Now, in your General Issues Award, when you looked  
 25 at the interpretative elements with the rigour that you

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16:58 1 that best practices are required of India precisely by  
 2 reference to these terms because they don't define and  
 3 crystallise in time.  
 4 We also, by way of further example, have the example  
 5 of e-flow, which we spoke about going back to the  
 6 Kishenganga partial and final award, where the Court  
 7 spoke about customary international law in order to look  
 8 at the requirements of environmental flow.  
 9 So the point I'm sure is a point, Mr Chairman,  
 10 members of the Court, that you absolutely have. I just  
 11 want to make sure that Pakistan's position is completely  
 12 on the record.  
 13 The bargain of the Treaty crystallised in 1960. It  
 14 crystallised like a boundary. It is not open to change  
 15 for reasons of fundamental change of circumstance, as  
 16 may be contended. The language of the Treaty, where  
 17 there are defined terms, crystallised in 1960 because  
 18 that's what the Parties intended.  
 19 Where, however, there is express language in the  
 20 Treaty which contemplates something which is capable of  
 21 being looked at through the lens of today, then Pakistan  
 22 has accepted willingly, and advanced indeed  
 23 affirmatively on the record, that it must be looked at  
 24 through the lens of today. So India cannot design and  
 25 construct and operate a HEP on the Western Rivers by

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16:59 1 reference simply to 1960s technology, in circumstances  
 2 in which the language is "sound and economical design  
 3 and ... satisfactory operation of the works".  
 4 As I say, Mr Chairman, I don't anticipate that this  
 5 was in the recesses, in the shadows behind your  
 6 question, but I just wanted to make sure that Pakistan's  
 7 position is absolutely clear.  
 8 And before, Mr Chairman, I cede the microphone,  
 9 I'm looking both at my Agent and Attorney General and at  
 10 Professor Webb to see whether I have misspoken.  
 11 Professor Webb says I have not misspoken but the  
 12 Attorney General is keeping very stony-faced! The  
 13 Attorney General is at least reluctantly waving me on.  
 14 So it is my neck on the chopping block when it comes to  
 15 these issues.  
 16 THE CHAIRMAN: Well, I don't think anyone's neck is in  
 17 danger here, Sir Daniel. Thank you for those  
 18 reflections.  
 19 We have actually hit the witching hour. But let me  
 20 just assure you that my question to Professor Webb about  
 21 the temporal element, if you will, was exclusively in  
 22 the context of the issues we're talking about here in  
 23 Phase 2, and not attempting to go back to anything else,  
 24 and was really just clarifying in my mind that when  
 25 we're interpreting texts about the loads of the plant,

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17:03 1 1960. That bargain has been utilised and relied upon by  
 2 India and employed by India to the disadvantage of  
 3 Pakistan, and that's one of the reasons why we're here.  
 4 And where there are express terms that were at the core  
 5 and the heart of the agreement, those are the express  
 6 terms that we agreed to in 1960.  
 7 But as you say, there's no issue, I think, across  
 8 the bar on this.  
 9 THE CHAIRMAN: Thank you. I think that's well understood.  
 10 SIR DANIEL: Thank you.  
 11 THE CHAIRMAN: Please proceed.  
 12 SIR DANIEL: Mr Chairman, members of the Court, just in my  
 13 very, very brief closing remarks -- and before I get  
 14 there, because this will depend on whether we put  
 15 something on the screen or whether we don't put  
 16 something on the screen, we have for you, and we will  
 17 have under the signature of the Attorney-General in just  
 18 a moment, Pakistan's final submissions.  
 19 I don't propose to make submissions on the final  
 20 submissions, because the final submissions are signed,  
 21 this is what our position is, and you will get them in  
 22 due course. But it may be useful, while you still have  
 23 counsel at the microphone, for me just to walk you  
 24 through, in case you've got any issues that you would  
 25 like to raise, as it were, on the margins of the

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17:01 1 it's correct to be thinking about that in today's world,  
 2 as opposed to what the world might have looked like back  
 3 in 1960. And my impression is that that is the approach  
 4 that Pakistan has taken in its presentations and that  
 5 we should proceed on that basis.  
 6 SIR DANIEL: Mr Chairman, I think that that's absolutely  
 7 right, for the reasons that you've heard from all of my  
 8 colleagues.  
 9 And certainly the legal counsel who have addressed  
 10 you have made a point of saying: there are some terms  
 11 that are defined in the Treaty, and we've taken you back  
 12 to those. We've got "Firm Power"; we've got language in  
 13 the Treaty which defines specific terms that are  
 14 relevant to your task. But we've also got some rather  
 15 more open-ended formulations in the Treaty which don't  
 16 define the terms but use these concepts, and there are  
 17 also circumstances that are relevant to your task where  
 18 the terms are not even found in the Treaty.  
 19 So obviously this is an interpretative exercise that  
 20 is taking place in 2026 and it is looking to the future,  
 21 not just to the past. But I think there is so the much  
 22 scope for opening wounds in respect of this Treaty and  
 23 the dispute between the Parties going back for some  
 24 decades that I wanted to make it absolutely clear that  
 25 Pakistan stands by the bargain that was concluded in

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17:04 1 submissions.  
 2 I note though that in paragraph 3.6 of PO18, that:  
 3 "... any Hearing Materials shall be sent to the  
 4 other Party and the PCA ... [an] hour before they are  
 5 deployed ..."  
 6 Our interpretation, my interpretation, is that  
 7 a copy of the final submissions that are already set in  
 8 stone are not hearing materials, and therefore we would  
 9 be content to put them on the screen, but I don't want  
 10 to be held to be, as it were, in contempt of your PO by  
 11 doing so. I'm quite happy just to talk to them if you  
 12 don't want me to put them on the screen. But if you  
 13 direct that they are not hearing materials and they can  
 14 be put on the screen, then you might find it useful to  
 15 see them.  
 16 THE CHAIRMAN: I think we can regard them as not being  
 17 hearing materials. So if you are able to put it on the  
 18 screen, as you discussed, then that's probably of help  
 19 to the Court.  
 20 SIR DANIEL: Thank you very much.  
 21 Abdullah, may I ask you just to, as it were, zoom  
 22 out so that we see the whole of the page for the moment,  
 23 if you can do so. And also just show that there are two  
 24 pages to it, yes.  
 25 I will, in a moment, ask my colleague Mr Tariq just

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17:05 1 to zoom in so we can look at particular provisions. And  
 2 as I say, this is not for purposes of making submissions  
 3 on them but to explain what we've done, because there is  
 4 a material, even fundamental, revision of these final  
 5 submissions beyond those that we put in in our Memorial.  
 6 I should say though that these revised final  
 7 submissions do not, in any dot or comma, go beyond our  
 8 submissions to you, either our written or our oral  
 9 submissions. So they are absolutely within the four  
 10 corners of what we've had to say.  
 11 But we have been very attentive to the exchanges  
 12 across the bar on our case and on your concerns. And  
 13 indeed, as I have suggested right from the beginning, on  
 14 our appreciation that we are a little bit operating on  
 15 shifting sands, we put in a submission two weeks ago.  
 16 We've reflected on that; we've had your responses.  
 17 We are also conscious that, as I say, we are playing on  
 18 your turf rather than our turf because we are advancing  
 19 issues in relation to a methodology that we didn't  
 20 advance.  
 21 But we've been very attentive to the exchanges  
 22 across the bar, and the reformulation attempts to  
 23 address three key elements at the heart of this phase  
 24 that I identified a little bit earlier: in other words,  
 25 the Treaty framework, how the Treaty framework informs

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17:08 1 paragraphs (2)(a) and (b), paragraph (2)(g)(i) and  
 2 paragraph (3). So a large portion of that now, for  
 3 purposes of simplification of the task, we haven't  
 4 reproduced here.  
 5 [Appendix] C of our written final submissions simply  
 6 pulled together and restated findings that were in the  
 7 analysis part of your General Issues Award. It repeated  
 8 the "realistic, well-founded, and defensible  
 9 projection", and then went on to address how this ought  
 10 to be addressed by reference to other findings that you  
 11 had made: "actually operated", "once constructed" and so  
 12 on. Again, we haven't repeated those because those are  
 13 already in your General Issues Award. If you consider  
 14 that it's useful to repeat them, they are there, but  
 15 we are already bound by that.  
 16 Then there are two paragraphs in the written -- in  
 17 the Memorial final submissions; that's paragraph (2)(g),  
 18 which we have retained but we have revised. One relates  
 19 to paragraph 15 and the other relates to e-flow. But  
 20 the intent behind them is not different and remain[s].  
 21 Where we have made a material change -- or two  
 22 material changes -- are in respect of what was in  
 23 paragraphs (2)(d) to (f), so it's essentially three  
 24 subparagraphs of the original final submissions, which  
 25 addressed such matters as ramp-up/ramp-down time,

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17:07 1 India's projection of installed capacity and anticipated  
 2 load, and how India's projection needs to be taken into  
 3 account for purposes of the calculation of maximum  
 4 pondage.  
 5 Now, before I walk you through the various  
 6 paragraphs, let me just relate these final submissions  
 7 to the final submissions as they were set out in our  
 8 written Memorial.  
 9 In our written Memorial, you will recall -- and you  
 10 don't need to call it up; you will have this clearly in  
 11 mind. But you will recall that in paragraph 5.7 of the  
 12 written Memorial, we set out the detail of our final  
 13 submissions both in blue text and in black text. The  
 14 blue text was repeating elements that you had already  
 15 addressed, and the black text was new. And the reason  
 16 why we put some text in blue was that we proposed at  
 17 that point that it might be useful for you to, as it  
 18 were, produce/come up with an holistic dispositif, so  
 19 that it was quite clear what your findings are on  
 20 pondage as a whole.  
 21 Now, that blue text in the earlier submissions that  
 22 was simply a restatement of your prior binding findings,  
 23 we have not reproduced again in these final submissions;  
 24 we simply are resting on what was said before. And that  
 25 relates to, in the old submissions, paragraph (1),

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17:11 1 operation of best efficiency point. It also sought to  
 2 put a finger on the -- that how the HEP will actually be  
 3 operated must be determined by reference to hydrology at  
 4 the site and the needs to the power system.  
 5 We hope that we have been attentive to the exchanges  
 6 in the proceeding, and we have reworked those in the way  
 7 that I have suggested.  
 8 And then we have also added to our current  
 9 submissions three further requests, which are at  
 10 paragraphs (3), (4) and (5) of the current submissions.  
 11 And this is to include issues that we consider were not  
 12 sufficiently addressed, or not addressed at all in the  
 13 Memorial version, but were nonetheless captured in our  
 14 written and oral submissions.  
 15 And if we can then zoom in to the first page, so  
 16 that I can actually make this a little bit more readable  
 17 to you. And again, I won't make submissions on them,  
 18 I will just address them.  
 19 Paragraph (1) invites the Court simply to make  
 20 an affirmation of the fact that there are Treaty limits  
 21 to the projection of installed capacity and anticipated  
 22 load.  
 23 Paragraphs (2)(a), (b) and (c) address the issues  
 24 that I addressed in my opening submissions this  
 25 afternoon; in other words, the information that India

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17:12 1 must provide to Pakistan. And here we have tried to  
 2 pare it back to its real essence because we don't want  
 3 this to be the exorbitant checklist but the real essence  
 4 of the information that is needed.  
 5 And you will see towards the end of the chapeau of  
 6 paragraph (2), before we identify the information and  
 7 explanation, that we say that "The information and  
 8 explanation must include the following". And there is  
 9 obviously an emphasis not just on the information but  
 10 the explanation.  
 11 Then paragraph (3) addresses an issue that  
 12 I addressed in opening yesterday, which is the  
 13 consequence of India not providing the information. The  
 14 Court, in its Award, addressed this in terms of burden  
 15 of proof. I, in opening yesterday, addressed it in  
 16 terms of a presumption of inconsistency. And we have  
 17 simply added the presumption of inconsistency into our  
 18 requests here.  
 19 Then in paragraph (4), and indeed paragraph (5),  
 20 we addressed what we think was a failing in our written  
 21 submissions, because in our written submissions we  
 22 addressed -- perhaps I shouldn't say "a failing"; it was  
 23 perhaps insufficiently developed. We did not address  
 24 sufficiently what India must do with the information  
 25 that is provided to us, because the information that is

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17:16 1 We had a version of this in the earlier written  
 2 submissions, but much more simply stated. But in the  
 3 light of the exchange across the bar on what we take to  
 4 be the understanding of paragraph 15, we thought that it  
 5 would be usefully captured in your dispositif in the  
 6 award to come.  
 7 And then in paragraph (7), we return to the issue of  
 8 e-flow, which is very largely in the same terms as  
 9 we included in the earlier formulation.  
 10 So, Mr Chairman, members of the Court, as I say,  
 11 I don't propose to make any submissions on the substance  
 12 of it, but I do invite any questions that you may think  
 13 it appropriate to raise about the issues in the margins.  
 14 Professor Minear, you raised a question right at the  
 15 outset yesterday morning, when I anticipated that we  
 16 would be revising the final submissions, you put your  
 17 finger on it just to make sure that you understood  
 18 clearly what I was saying, and I interpreted perhaps  
 19 an element of enquiry behind that as to whether it's  
 20 appropriate to revise final submissions.  
 21 And I made the point at that stage that it's not  
 22 only appropriate but indeed entirely warranted and  
 23 sometimes common in multiple proceedings of this kind,  
 24 including across the hallway, precisely to ensure that  
 25 a litigant, if it is faced by a coherent argument from

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17:14 1 provided to us obviously is provided to Pakistan to  
 2 allow Pakistan to make an assessment of it, and to allow  
 3 Pakistan either to agree with it or take issue with it.  
 4 But that information is also what informs India's  
 5 realistic, defensible and well-founded analysis. So  
 6 paragraph (4) simply proposes that what India must do  
 7 with this information is it must use its information for  
 8 that projection.  
 9 And then paragraphs (5)(a) and (b) address the  
 10 relevance of this information to the calculation of  
 11 maximum pondage. So it is simply providing the  
 12 continuum. It's not just that India must have the  
 13 information, and it's not just that India must pass the  
 14 information to us, but it's also that India must itself  
 15 use the information for its own projections; and that  
 16 once it's made its projections, it must use that  
 17 information for the calculation of maximum pondage.  
 18 So we are trying to tie this much more closely to  
 19 paragraphs 3(b) and 4(h) and (i) in Appendix II. And as  
 20 I say, we hope -- and certainly what was driving this  
 21 was that we wanted to be responsive to what we thought  
 22 were the very helpful and important and prescient  
 23 questions that you put to us.  
 24 And then we have paragraph (6) and paragraph (7).  
 25 Paragraph (6) deals with paragraph 15 of Annexure D.

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17:17 1 the other side, is able to make an adjustment to its  
 2 final submissions to take account of the argument on  
 3 the other side. Here we don't have the other side, but  
 4 we do have very compelling enquiries by the Court.  
 5 So I think that there is nothing procedurally  
 6 improper in any way; indeed, it is procedurally entirely  
 7 proper that a party before a court makes an adjustment  
 8 to its requests within the framework of the petitum of  
 9 the case to ensure that the issues are narrowed and  
 10 refined as we come to your deliberations.  
 11 But if you have any other issues that you would like  
 12 to raise, please do so. We will not be making any  
 13 changes to this in the light of any questions that  
 14 you may raise because, as we say, this is locked.  
 15 (The members of the Court confer)  
 16 THE CHAIRMAN: Sir Daniel, one type of question that I think  
 17 the Court would welcome your reflections on is: if  
 18 we were to issue a dispositif along the lines of what  
 19 you've just described to us, would it apply to the  
 20 current Neutral Expert's proceedings? Bearing in mind  
 21 that whatever we might say about information that must  
 22 be provided, presumptions that should be drawn from  
 23 a failure to provide, might not be appropriate to be  
 24 applied retroactively.  
 25 SIR DANIEL: Mr Chairman, I hadn't anticipated that question

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17:20 1 but I think that there is a straightforward answer to  
 2 that, and that is: yes, it would absolutely apply, in  
 3 the same way as the General Issues Award would apply and  
 4 in the same way as the Clarification Decision would  
 5 apply.  
 6 The Neutral Expert, as I drew to your attention  
 7 yesterday, has expressly provided opportunity to the  
 8 Parties to address the Neutral Expert on your decision  
 9 in this phase in due course. As I mentioned to you  
 10 yesterday, we addressed your General Issues Award and  
 11 your Clarification Decision in some granular detail over  
 12 four days of hearings in Vienna in mid/late November,  
 13 including on the issues of pondage, and we identified  
 14 for the Neutral Expert, as you would expect, the issues  
 15 that are left open.  
 16 And you will also recall -- because this is a matter  
 17 that we addressed to you, and which the Neutral Expert  
 18 has now put on the website as a public decision -- that  
 19 we made a bifurcation application to the Neutral Expert  
 20 on the basis of our sense of urgency in his process.  
 21 But also we took the view that the Neutral Expert, on  
 22 the basis of your General Issues Award, was perfectly  
 23 able, as a matter of engineering capability, to reach  
 24 determinations, for example, on spillways, or even  
 25 the location of outlets --

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17:24 1 may not apply retrospectively -- I can see that, that  
 2 particular provision -- but a statement of what India is  
 3 required to provide is a very live issue even at the  
 4 moment.  
 5 So you may wish, as you reflect on the dispositif,  
 6 if you are persuaded by this aspect, to say that  
 7 a presumption cannot apply retroactively in some kind of  
 8 unreasonable template. But otherwise, I think  
 9 everything else would apply, because everything else  
 10 goes to the calculation and the information to be  
 11 exchanged.  
 12 THE CHAIRMAN: I think one difficulty we're running into,  
 13 and whether it requires some post-hearing submission is  
 14 something we can reflect upon, but you're presenting now  
 15 a dispositif to us that contains possibilities that  
 16 weren't really briefed in the Memorial and that,  
 17 although signalled yesterday, were not really developed  
 18 in the oral argument either. And so we're going to have  
 19 to reflect on our need to have further information from  
 20 you, on that point but on others as well.  
 21 This issue of a presumption, and whether there's  
 22 a basis in the Treaty, in international law, is a matter  
 23 that one might imagine could be developed further.  
 24 I noticed in the draft dispositif, I believe,  
 25 an expectation that the HEP must feed into the regional

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17:22 1 THE CHAIRMAN: I'm not sure you fully understood what I was  
 2 asking.  
 3 There's no question in our mind, I think, that the  
 4 Issues of General Interpretation Award applies to the  
 5 current Neutral Expert's proceeding, and we'll have to  
 6 reflect on the dispositif that you're now suggesting to  
 7 us. But it looked like you were asking us to say: if  
 8 India, when they notify you of the design of the  
 9 plant -- and this presumably would include KHEP and  
 10 RHEP -- fails to provide certain information, that leads  
 11 to a presumption of non-compliance.  
 12 Given that those notifications occurred some time in  
 13 the past, it seems to raise an issue of a potential  
 14 retroactive application of the award to circumstances  
 15 where it was unknown what was expected.  
 16 SIR DANIEL: Thank you, Mr Chairman, for that clarification.  
 17 I can see that a presumption that is adopted now may  
 18 raise perhaps a philosophical and legal question about  
 19 whether that presumption can apply in respect of  
 20 information that was not provided 5 years ago or  
 21 10 years ago or 15 years ago.  
 22 As you will know, Pakistan has taken issue with  
 23 India in respect of its notifications, including in  
 24 respect of the KHEP and the RHEP, as regards precisely  
 25 this information that is in issue. So the presumption

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17:26 1 grid, which would seem to suggest India can't build  
 2 a HEP that it doesn't connect to the grid, and it's not  
 3 obvious to me that the Treaty would prohibit that.  
 4 So it's just a signal: there are few issues here  
 5 that pop into my mind that the Court will need to be  
 6 thinking about, and if we feel a need to come back to  
 7 you for further briefing, you'll understand that that's  
 8 what we're doing.  
 9 SIR DANIEL: Yes, indeed, Mr Chairman, and not to pour too  
 10 visibly cold water on the prospect of a post-hearing  
 11 submission.  
 12 Of course, now that you've put your finger on the  
 13 point of: well, what happens if India wants to construct  
 14 a HEP which is not connected to the grid, that is just  
 15 attached to some commercial industrial plant; yes,  
 16 perhaps so, and as we think creatively, we may come up  
 17 with all sorts of circumstances. And no doubt in your  
 18 careful deliberations you will be more creative than  
 19 we have been able to be in looking to the future and  
 20 looking to those possibilities.  
 21 Of course, if you do identify a particular scenario  
 22 that, as it were, upends everything, then I think it  
 23 would be our expectation that you would come back to us  
 24 for further submissions, because obviously we would want  
 25 to have an opportunity to comment on that.

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17:27 1 If, however, as you did with the General Issues  
 2 Award, you came to the conclusion that there were  
 3 elements on the fringes, or possible exceptions that  
 4 we hadn't taken into account, then I think that would be  
 5 just part of the normal judicial process where you would  
 6 address them.  
 7 We are, of course -- we will not stand shy of making  
 8 submissions to you. And my thought about, as it were,  
 9 pouring cold water on that idea was not because we don't  
 10 want an endless opportunity to stand here and to address  
 11 you, but we are very conscious of time. And if this is  
 12 going to be a useful exercise, it's going to have to be  
 13 a useful exercise that is done as expeditiously as  
 14 possible.  
 15 THE CHAIRMAN: Very good. That's well understood.  
 16 Was there anything further you wanted to present?  
 17 SIR DANIEL: Nothing from me; just to invite you to call the  
 18 Attorney General. And I will whisper to him as he goes  
 19 past that if he wants to disavow me, now is the only  
 20 time to do so!  
 21 THE CHAIRMAN: Very good. Well, thank you, Sir Daniel, for  
 22 your presentation. It was very helpful.  
 23 Mr Attorney General, you're welcome to come to the  
 24 podium for your concluding remarks and to present the  
 25 final submissions.

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17:30 1 an elaboration of obligations upon India that would make  
 2 the Treaty more onerous in its implementation for India  
 3 than what was intended when the Treaty was concluded in  
 4 1960.  
 5 I conclude with an observation that I made in  
 6 opening Pakistan's case in these proceedings yesterday.  
 7 Pakistan is here before you, and is before the Neutral  
 8 Expert, even though the chairs opposite us are empty and  
 9 even though India has adopted the abeyance policy that  
 10 it has, because we believe in the cornerstone character  
 11 of the Indus Waters Treaty in relations between Pakistan  
 12 and India, and in the high importance of the peaceful  
 13 settlement of international disputes, including through  
 14 independent third-party adjudication.  
 15 When Pakistan is respondent in proceedings brought  
 16 by India, we turn up, we put our arguments, we accept  
 17 the outcome, we adjust our conduct, if that is what is  
 18 warranted. We expect this of India.  
 19 We regret that India is not here in these  
 20 proceedings. It and we will need to find a way back to  
 21 engagement and accommodation under the Treaty, and with  
 22 respect to wider related issues. These issues are too  
 23 important to both States, and for our populations, for  
 24 them to be left to fester in the way that they are at  
 25 present. Your decisions and awards in these proceedings

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17:28 1 MR AWAN: Mr Chairman, members of the Court, I am pleased to  
 2 come back to the podium to close Pakistan's case in this  
 3 phase of the proceedings. I will be very brief in my  
 4 closing remarks, before I read into the record  
 5 Pakistan's final submissions.  
 6 You have heard Pakistan's submissions on legal and  
 7 engineering issues. The theme with which I began, and  
 8 which was picked up by our counsel and engineering team,  
 9 is that it is important that your award in this phase of  
 10 proceedings provides as much clarity and certainty as  
 11 possible on the issues on which you are now focused,  
 12 subject to the framing propositions that you have heard  
 13 from Sir Daniel in his opening submissions this  
 14 afternoon.  
 15 Although it is not necessary for me to do so, let me  
 16 underline what he said to the effect that your  
 17 elaboration of a framework under the Treaty, relevant to  
 18 the issues engaged by this phase, should avoid being  
 19 overly and unnecessarily prescriptive to and  
 20 constraining to India, but that it must also be  
 21 attentive to the challenges that have arisen  
 22 historically on the issues in question.  
 23 Your award, in due course, must serve both to make  
 24 the Treaty more workable and also more effective. It is  
 25 no part of Pakistan's case to seek from you

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17:31 1 provide, and will provide, an anchor of legality when  
 2 the time comes for refreshed engagement, and we thank  
 3 you for this, whatever the outcome.  
 4 Before I read Pakistan's final submissions -- and  
 5 I know that there is a CMC session still to come -- let  
 6 me say, in this august venue, the Peace Palace, that it  
 7 is welcome to toil in place and in an environment that  
 8 is of itself a marker and exemplar of the empire of law.  
 9 I am the Attorney General of my country and my voice is  
 10 to be a messenger of the law.  
 11 May I, in closing, convey Pakistan's thanks and  
 12 appreciation to the PCA Secretariat and to all of its  
 13 team for accommodating and hosting us so very well over  
 14 the past days. We are very grateful to all those in the  
 15 room and also to those who are behind the scenes, and  
 16 I of course include the AV technicians, the caterers and  
 17 the others.  
 18 I would also like to convey Pakistan's appreciation  
 19 to the court reporter, Mr Trevor McGowan, for  
 20 memorialising so professionally and efficiently our  
 21 words for the purposes of the deliberative and  
 22 historical record. We are grateful.  
 23 Lastly, Mr Chairman, members of the Court, let me  
 24 convey Pakistan's appreciation to you, whatever the  
 25 outcome. We acknowledge your notable and impressive

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17:33 1 mastery of the record. We affirm the rigour and the  
 2 manifest fairness of the proceedings. We thank you,  
 3 sirs.  
 4 Mr Chairman, with this said, let me now read  
 5 Pakistan's final submissions into the record.  
 6 Having regard to the Court's analysis and findings  
 7 in its Award on General Issues of Interpretation of the  
 8 Indus Waters Treaty and its Decision on Pakistan's  
 9 Request for the Clarification of the Award on General  
 10 Issues of Interpretation, Pakistan requests the Court to  
 11 adjudge and declare:  
 12 (1) That the Treaty contains limits on the  
 13 projection of installed capacity and anticipated load of  
 14 an Annexure D, Part 3 HEP in paragraphs 8(a), 8(b) 8(c)  
 15 and 15 of Annexure D and Appendix II to Annexure D of  
 16 the Indus Waters Treaty.  
 17 (2) That India must communicate to Pakistan as part  
 18 of its Annexure D, paragraph 9 notification of the  
 19 design of a proposed Annexure D, Part 3 HEP, information  
 20 and explanation relating to India's calculation for  
 21 maximum pondage, and that such information and  
 22 explanation must include the following:  
 23 (a) a representative weekly load curve for the dry  
 24 season in the Northern Region Grid, based on historical  
 25 load demand data, accompanied by the underlying data;

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17:34 1 (b) information on the anticipated future load,  
 2 including any underlying data, if India desires to  
 3 account for such future load in its projection of the  
 4 anticipated load of a proposed Annexure D, Part 3 HEP;  
 5 (c) a justification for the projection of the  
 6 installed capacity of a proposed Annexure D, Part 3 HEP,  
 7 having regard to the hydrology at the HEP site and the  
 8 anticipated load.  
 9 (3) In the event that India fails to provide the  
 10 information in paragraph 2 above, or provides materially  
 11 insufficient information, there will be a presumption  
 12 that India's projection of the proposed Annexure D,  
 13 Part 3 HEP's installed capacity and anticipated load is  
 14 not realistic, well-founded and defensible, and does not  
 15 accord with the anticipated actual operation of that  
 16 HEP.  
 17 (4) For purposes of India's projection of a proposed  
 18 Annexure D, Part 3 HEP's installed capacity and  
 19 anticipated load, India must take account of and base  
 20 such projection, inter alia, on the information  
 21 identified in paragraph 2 above.  
 22 (5) Having so determined its proposed Annexure D,  
 23 Part 3 HEP's anticipated load and installed capacity,  
 24 India must account for the projection of installed  
 25 capacity and anticipated load in its calculation for

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17:36 1 maximum pondage:  
 2 (a) in a manner that enables a proposed Annexure D,  
 3 Part 3 HEP to make a meaningful contribution to the  
 4 Northern Region Grid on a daily and weekly basis at  
 5 times of peak demand, including by setting a daily  
 6 dispatch schedule, comprising its duration and capacity,  
 7 that is realistic considering the operation of the HEP  
 8 within the Northern Region Grid, and allocates  
 9 a distribution of demand as between weekends and  
 10 weekdays that corresponds to the actual demand on the  
 11 power system; and  
 12 (b) in a manner that corresponds with the  
 13 operational requirements of the proposed Annexure D,  
 14 Part 3 HEP's turbines.  
 15 (6) Paragraph 15 of Annexure D does not function as  
 16 an ab initio design criterion to be applied at  
 17 the outset of the design process, but is rather  
 18 an operational constraint that is relevant for purposes  
 19 of the design process that must be applied to ensure  
 20 that pondage required for firm power shall be calculated  
 21 in a manner that abides by the daily and weekly releases  
 22 requirement set out in paragraph 15 of Annexure D.  
 23 (7) Having regard to India's obligation under  
 24 customary international law to prevent significant harm  
 25 to the environment through provision of an environmental

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17:37 1 flow specific to the site of a proposed Annexure D,  
 2 Part 3 HEP site, pondage required for firm power shall  
 3 be calculated in a manner that abides by such  
 4 obligation.  
 5 Thank you, sir.  
 6 THE CHAIRMAN: Thank you very much, Mr Attorney General, for  
 7 those concluding remarks and indication of Pakistan's  
 8 final submissions. I think it just falls to me to make  
 9 a few concluding remarks of my own.  
 10 Concluding remarks  
 11 THE CHAIRMAN: I'll start with the issue of the Court's  
 12 hopes in terms of issuance of an award on the Second  
 13 Phase. The Court has not yet deliberated with respect  
 14 to the various issues that are before us, but we are  
 15 going to attempt to work our way through those issues  
 16 and develop an award in the hope that it might be issued  
 17 sometime by the first half of April, if not sooner,  
 18 bearing in mind the collateral proceedings that are  
 19 going on before the Neutral Expert. In the event that  
 20 we in due course think that it may take us longer to  
 21 issue an award, we can let the Parties know that, in the  
 22 event that it's helpful for purposes of the schedule  
 23 before the Neutral Expert.  
 24 Beyond that, I think I will just move directly to  
 25 saying my own thanks: to the Attorney General, to the

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17:39 1 Ambassador, to the Commissioner, for your attendance at  
 2 this proceeding. It indicates the great seriousness  
 3 with which Pakistan takes these proceedings, and  
 4 the Court is grateful for your presence.  
 5 Also to express thanks to the team of counsel led by  
 6 Sir Daniel Bethlehem; and not just those that have  
 7 spoken here, but those who have backed up those who have  
 8 spoken. It's been a very helpful day and a half for us,  
 9 and we don't take lightly what it requires to develop  
 10 the written pleadings, the initial oral pleadings and --  
 11 perhaps even more so -- the second-day proceedings,  
 12 given the limited amount of time you have to respond to  
 13 the many questions that we had.  
 14 We appreciate as well the technical advisors who  
 15 have joined the delegation here to help guide us through  
 16 some of the more technical aspects of the matters before  
 17 us. All of this has been quite helpful to us, and the  
 18 Court is quite grateful for all of the effort that's  
 19 gone into this.  
 20 Of course I also want to thank our PCA colleagues  
 21 and support team for their exceptional assistance  
 22 throughout this hearing; also to our court reporter for  
 23 his diligent work, of which more still remains to be  
 24 done, and we are very grateful to him as well; and of  
 25 course the technical AV staff. It is much appreciated

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17:41 1 everything you do to make this go smoothly.  
 2 So with that, I think I will bring to a close the  
 3 Hearing on the Second Phase and declare that Hearing to  
 4 be over.  
 5 (5.43 pm)  
 6 (The hearing concluded)  
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ARBITRATION PURSUANT TO ARTICLE IX AND ANNEXURE G OF THE INDUS WATERS TREATY 1960

Day 2 -- Hearing on the Second Phase on the Merits

Tuesday, 3 February 2026

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