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## **Stable is safe. The Munich Position on Climate and Cultural Heritage**

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The Bizot Group, in which the directors of an impressive set of major museums worldwide are represented, has turned its attention to the 'green museum' and the topic of 'sustainability'. The minutes of a meeting of the Bizot Group in Frankfurt from 25 to 27 October 2012 (Appendix 7) names a whole collection of measures with the help of which the ecological footprint of museums will, it is hoped, be reduced in future. The aim is a critical examination of standard conditions in depositories and exhibition rooms (in particular however in connexion with loans), the demand for a different museum architecture and museum climate control, and the desire to reconcile long-term conservation concepts with the need to use less energy. As the minutes say, 'care' of the cultural heritage is the supreme imperative. However, the intention is to abandon globally uniform standards, such as we find in many loan contracts, e.g. specifying 20°C and 50% relative humidity. Instead, the proposal is a targeted adaptation to the individual requirements of different materials and different climate regions. In this context, the question of climate fluctuations and their frequency is to be given particular attention. The Bizot Group demands passive climate-control strategies, which require less maintenance and thus also mean lower costs. 'Natural environmental controls', they say, should be investigated and deployed. Above all, however, there should be an obligation on the part of architects and engineers to reduce the ecological footprint whenever old museum buildings are refurbished or new ones built. Exhibition architecture should also be designed on the basis of maximum recycling and waste avoidance. In addition to this set of measures, Appendix 7 comes up with the

following 'Interim Guidelines' as its central point (they are even visually highlighted):

'For many classes of object[s] containing hygroscopic material (such as canvas paintings, textiles, ethnographic objects or animal glue) a stable relative humidity (RH) is required in the range of 40–60% and a stable temperature in the range 16–25°C with fluctuations of no more than  $\pm 10\%$  RH per 24 hours within this range. More sensitive objects will require specific and tighter RH control, depending on the materials, condition, and history of the work of art. A conservator's evaluation is essential in establishing the appropriate environmental conditions for works of art requested for loan.'

How are these goals to be reached and how are we to deal with these 'Interim Guidelines'? Before seeking an answer to these questions, we ask the following question: Who are the Bizot Group actually? The Bizot Group has taken on the obligation of organizing major exhibitions. *Honi soit qui mal y pense*, for after all, from this new perspective, the catalogue of measures can be read as a way to facilitate loans that is as 'green' as it is 'sustainable'. Each of these points gives the museums more free play, which can be used for additional vitalization of the global boom in exhibition activity. If, then, the final paragraph of the minutes says that the members of the Bizot Group should commit to examining in every individual case whether a courier is really necessary, doubts begin to grow concerning the honesty of the 'green' idea. Alongside questions of energy consumption, a recent online survey among the members of the Bizot group comes up abruptly with the (presumably central) question of whether the 'Interim Guidelines' are to be followed, and if not, why not. The question 'If yes, why?' is not asked.

The argument occasionally adduced, namely that neither conservators nor conservation scientists are represented in the Bizot group and that therefore the initiative need not be taken seriously in the first place, demonstrates a quite fundamental misunderstanding. In principle, the endeavour to reduce the ecological footprint of our museums deserves all the support it can get. Why ICOM does not take up this topic is another matter. The IIC played along at least at its 2008 London meeting to great media effect, but then let the matter drop. One could, therefore, allow the validity of the basic 'green' and 'sustainable' tenor, but would have to dig deeper when it comes to the 'Interim Guidelines'. That these are indeed only 'interim' may be because the Bizot Group is aware of the necessity to learn, if possible, more about this complex subject through

further investigations, and thus to formulate robust statements. Even from the perspective of the Group, this can only be done in close co-operation between conservators, conservation scientists and the managements of the individual museums.

As the authors are aware, quite a number of museums have already accepted the 'Interim Guidelines', indeed apply these provisional directives. Experience shows that it will be only a matter of time before these are recklessly reduced to 'relative humidity 40–60%, temperature 16–25°C', and then turn up as legally binding in loan contracts, before being codified as general reference values.

Let us not ask about the mathematical sense of the above specification. Do not ask about the meaning of 40–60 %  $\pm$ 10 % RH in 24 hours within this range! Does it mean that a relative humidity of 55% is allowed to fluctuate between 45 and 60 %? Or does that mean that for a relative humidity of 50% a even wider corridor of 40 to 60 % is to be accepted? What does mean 'stable' if in the worst case the relative humidity allowed to fluctuate 20 % during one day? We shall not yet get an answer. Let us ask, rather, about where we now are.

It is well known to those familiar with Preventive Conservation that the hitherto valid climate specifications have long been on the hit list. Not least as a result of the fundamental work done by Marion Mecklenburg, Charles S. Tumosa, David Erhardt, Stefan Michalski, Roman Kosłowski, Łukasz Bratasz, Michał Łukomski and others, people's views of the effects of humidity fluctuations on hygroscopic materials has changed. The focus is now on humidity fluctuations, the estimation of possible damage resulting from long-term or short-term fluctuations, and the physical investigation of the mechanical behaviour of individual materials right up to their fatigue-fracture limits. Ultimately what we have are keywords such as ASHRAE 2007 or Michalski's *proofed fluctuation concept*, which testify to a considerably more 'relaxed' attitude towards climate fluctuations.

Booked-out events such as the *Museum Microclimate* congress at the National Museum in Copenhagen in 2007, or the congress entitled *Klima und Kulturgut: Wissen und Unwissen | Climate for Collections: Standards and Uncertainties* held at the Pinakothek der Moderne in Munich in November 2012, directed their attention to interesting individual studies in the laboratory and on the original, opened up new possibilities in measurement technology, and provided new estimates of risk. What neither laboratory experiments nor individual case studies can do, however, is take responsibility for valuable loans or exhibits. For

this reason, the Munich congress did not come up with a position on climate specifications, acceptable fluctuation ranges, or the time scales within which the latter can be regarded as tolerable. And for a good reason: for while the state of research, in the opinion of the present authors, is advanced, it has not yet reached the point where robust general statements can be made on climate fluctuations and their effects – even though at the Munich congress the expectations were otherwise.

The authors of the present contribution, who were among the initiators and organizers of the Munich congress, nevertheless feel obliged to summarize their conclusions from the congress and the years of debate on the topic of climate and the cultural heritage.

1. The main cause of the poor energy balance of today's museums is inappropriate architecture. Future energy savings can only be achieved through hygro-thermally optimized building fabric (moisture-buffering surface materials, thermal mass etc.) and changed climate control strategies. Already today, depository buildings and archives can be constructed as passive or even as energy-plus buildings. The passive climate control strategies used in such places can also be transferred to museums or reading rooms.
2. The climate situation in old museum buildings can rarely be reconciled with the demands made on a museum. In the past, the installation of air conditioning units in existing historic fabric led to irrecoverable losses in the latter. The recommendation here is to consider alternative methods of climate control ('Temperierung', conservation heating etc.). These can substantially improve the climate conditions on the spot and at the same time protect the historic building fabric.
3. If appropriate climate conditions cannot be achieved by measures that protect the building, or by adapting the exhibition concept (e.g. micro-climate cabinets), sensitive artworks should simply not be exhibited there.
4. In historic rooms, the preferred room climate can fluctuate around the long-term mean without damaging the art and cultural items on show. The long-term mean is determined by the building situation and the

external climate, and need not necessarily reflect the standard values of 50% relative humidity or a temperature of 20°C.

5. Energy-related improvements to existing buildings and their air conditioning units must be the primary aim. The savings that can be achieved thus make a substantial contribution to the reduction of the ecological footprint as well as the building's running costs. Ongoing maintenance and inspection of climate control units accounts for a large share of the latter. In-house technical staff should be employed, appropriately remunerated and given regular training.
6. Existing air conditioning is optimized to current climate specifications. They are mostly set to specific set points (e.g. 20°C and 50%). The fluctuation aimed at in the 'Interim Guidelines' of the Bizot Group within a particular corridor (e.g. 40–60%) is only possible, if at all, with adjustments to the control systems, and without such adjustments it may even increase energy consumption.
7. Humidification is possible at little expense in terms of energy, while heating, cooling and dehumidification require more. The latter processes are thus responsible for high energy bills. Heating and cooling serve as a rule only to fulfil criteria of human comfort. They must therefore be subject to critical questioning. From the conservation point of view, the interior temperatures may vary with the seasons.
8. Hygroscopic materials are in equilibrium with the long-term climate of their location. Loan-determined changes of location can therefore cause irreversible damage to artworks. Loan enquiries to places with a different indoor climate (historic buildings, non air conditioned museums, private residences etc.) require critical risk assessment and special precautionary measures.
9. Practical experience shows that guaranteed climate specifications in loan contracts of, e.g.,  $50 \pm 5\%$  relative humidity and 19–21°C for the temperature, are exceeded or undershot from time to time. The cause may be extreme weather conditions, technical failures or a short-term overcrowded situation at the opening event. All the same, air conditioning units should be oriented to normal rather than exceptional situations.

10. For technical reasons, no fluctuation range for relative humidity smaller than  $\pm 5$  percentage points should be demanded. Modern building control systems and climate sensors allow insights into the local climate situation, and form the basis for a regular evaluation of the climate data. Climate measurements should always be made close to the object.
11. Humidity fluctuations trigger elastic (reversible) and plastic (irreversible) deformations of hygroscopic materials. Scientific investigations to date on mechanical behaviour describe individual cases, but are not (yet?) in a position to claim general validity. The behaviour of different materials when combined, which is the case with the overwhelming number of artworks, can, with the procedures developed to date, only be modelled in a highly simplified form. All that can be said in general terms at the moment is that a stable room climate prevents deformations and thus guarantees a stable state of preservation. Stable is safe!
12. The experience of conservators with sensitive artworks (thin wood panels, polychromed sculpture, works on paper, photographs etc.) and observations of aged and non-aged surfaces speaks however for an immediate reaction. This reaction will vary from case to case, and cannot be predicted, which makes risk assessment more difficult. A maximum fluctuation range of  $\pm 10$  percentage points in relative humidity within 24 hours, as now laid down in the 'Interim Guidelines', is in our view not only problematic from the technical point of view (see point 6), but actually increases the risk, not least because there is no agreement on the maximum permissible frequency of humidity fluctuations within short time periods (hours, days). Robust, in other words scientifically verifiable, knowledge relating to short-term fluctuations in relative humidity is currently still the exception.
13. The hitherto valid agreed climate specifications in loan agreements (e.g. those of ICOM) are a valuable asset and should be retained, for they constitute to this day the basis for trusting and effective collaboration. They are, for good reason, geared to the most sensitive loans, and are thus valid also for less sensitive artworks. They minimize the risk for lenders and borrowers alike. The reversal of this procedure as sought by the Bizot Group turns the exception into the rule and thus increases the labour and expense involved in every loan. By virtue of the increased

risk, each and every loan agreement would have to be individually negotiated between the parties.

14. The implementation of hitherto valid climate specifications is already carried out with a sense of proportion: in the case of less sensitive loans or locations with a less good indoor climate, there is always (if requested) an individual assessment as to whether it is possible to depart from the guidelines. This assessment will take into account, and balance against each other, the climate conditions, locally and along the whole transport route, the time span and the risk posed to the specific artwork.
15. Every loan that does not take place reduces the ecological footprint and thus saves resources. Our cultural heritage forms a major part of these resources.

For all these reasons, the authors consider that it would be risky to follow the 'Interim Guidelines'. There is no alternative to "Stable is safe"!

So where is the problem? The initiative will in the future put us to a serious test. At their destination, our loans will be exposed to the climate conditions resulting from the relaxation. However the responsibility for the now more probable irreversible damage to individual loans ultimately remains with us as lenders and as owners. But will this prevent a loan? How will lenders position themselves in the *do ut des* [Lat. I give, in order that you give] of our age, for surely a lender's insistence on retaining the climate specifications that have prevailed to date will impede exchange? Or will those who do so insist increase the attractiveness of their institutions for potential lenders? And how will insurers react to the increased risk? And what will be the reaction of the owners of permanent loans which, while in our care, are repeatedly loaned to third parties? Will the terms and conditions of every loan in future have to be separately negotiated? Will in every case facility reports and climate charts have to be requested in order to ensure that the climate conditions are not even worse than those guaranteed in the 'Interim Guidelines'? The Bizot initiative thus gives rise to an abundance of hardly foreseeable consequences, which speaks in favour of retaining the existing practice.

The authors are convinced that the initial doubts of the Bizot Group, as set out in the Prague Protocol of 27–29 September 2010 (Papers, Item 4), are altogether justified. There it says: 'The key question is whether a reduction of emissions

needs to be achieved through the relaxation of the tight standards or rather in combination with improved and more suitable architectural structures and more efficient climate control measures. Here it is also worth pointing out that the possible relaxation of guidelines must be for the benefit of the environment and not in order to facilitate the lending of fragile objects.' In fact, a reduction in the ecological footprint of our institutions can be achieved far more effectively, and with no risk to the cultural heritage in our care, by other means. Thus the so-called 'energy contracting' recently agreed with success by the Bayerische Staatsgemäldesammlungen has reduced CO<sub>2</sub> emissions of the Pinakothek der Moderne by 47%, even though the set points have remained the same (relative humidity 50% ± 2.5%, temperature 20–21.5°C ± 1K). This saving corresponds to the CO<sub>2</sub> emissions of around 220 family homes or some 320 'circumnavigations' of the earth in a car. However, the savings of 45% in energy costs went not to major exhibitions, but rather to the investor who financed the technical refurbishment. The latter is a political decision, which, while contributing to the aim of a 'green museum', does shift the cost on to the next generation. Whether this policy is 'sustainable' is something one can argue about. What is not in doubt, though, is that the indoor climate quality maintained hitherto and indeed also after the 'energy contracting' were largely responsible in the past for the excellent condition of our sensitive collections. We do not want to depart from these values in the future either. To do so would increase the risk and do little to help the environment. The 'Interim Guidelines' increase the risk for all lenders. But without a doubt they are useful for the organizers of large exhibitions.

This text – translated by Michael Scuffil – can also be found in its original German version at [www.doernerinstitut.de](http://www.doernerinstitut.de). We should like to thank all those who have given us their critical opinions and made suggestions for changes. This includes all the participants of the Munich meeting of leading museum conservators from Germany, Switzerland and Austria.

The authors would be pleased to receive any comments on this controversial topic; e-mail to [norisk@doernerinstitut.de](mailto:norisk@doernerinstitut.de).

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