Witness Name:
Professor Timothy Sharpe
Dated: 14 October 2022
Ref: M2/SAGE/01/TS

COVID-19 INQUIRY – MODULE 2

Questionnaire Response – Professor Timothy Sharpe

1: Overview of qualifications, career history, professional expertise and major publications:

Qualifications

1.1. The following table outlines my qualification:

Table 1 – Qualifications

1983	B.Sc. Architecture, University of Dundee
1985	B.Arch. Architecture, University of Dundee
1990	Ph.D Architecture, University of Strathclyde

Employment History

1.2. The following table outlines my employment history:

Table 2 – Employment History

1985 - 1987	Research Assistant, Housing and Rehabilitation Research Unit, University of Strathclyde, Department of Architecture and Building Science
1988 – 1989	Studio Tutor, Graduation Studies, CAAD/Participation special study, University of Strathclyde, Department of Architecture and Building Science
1988 – 1992	Project Architect, Technical Services Agency/ Community Architecture Scotland

1991 – 1992	Consultant, Community Architecture Scotland
1991 – present	Registered Architect (ARB 56047B)
1991 – present	Architectural Expert Witness: Over 900 instructions for reports on environmental performance, dampness and disrepair, survey, reports and court proceedings
1992 – 2004	Lecturer Mackintosh School of Architecture
2004 – 2014	Senior Lecturer Mackintosh School of Architecture
2007 - 2020	Senior Researcher, Mackintosh School of Architecture
1995 - 2020	Director Mackintosh Environmental Architecture Research Unit
2014 - 2020	Professor of Environmental Architecture, Mackintosh School of Architecture
2020 – present	Professor of Architecture, Head of Department, Department of Architecture, University of Strathclyde

Professional Expertise:

1.3. I am a graduate of Dundee and Strathclyde Universities, with both practice and research expertise in low energy and sustainable architecture, construction, particularly ventilation, health and indoor air quality in housing.

1.4. My Ph.D. examined the nature of community architecture and design participation and after qualifying as an architect I worked on a variety of housing and other design and rehabilitation projects, and developed further expertise in energy related technical issues.

1.5. I moved back into academia at the Mackintosh School of Architecture to develop research interests in low energy and healthy buildings. I was previously Director of the Mackintosh Environmental Architecture Research Unit and am now Head of the Department of Architecture at the University of Strathclyde.

1.6. I have been principal investigator co-investigator on a range of projects investigating low energy and sustainable design with a value of over £7.5m and recent projects include:

(1) Influence of ventilation design on the prevalence of anti-microbial bacteria in homes.

(2) Breathing City: Future Urban Ventilation Network NERC NE/V002082/1.

(3) Health effects of modern airtight construction and subsequent follow-on study AHRC AH/N006607/1 and AH/S010467/1

(4) Gannochy Trust for BPE project investigating health and ventilation design in a new-build housing scheme for the Gannochy Trust in Perth, Gannochy Trust and Construction Scotland Innovation Centre

(5) Fabric Integrated Thermal Storage in Low Carbon Dwellings (FITS-LCD) EP/N021479/1, EPSRC

(6) A Meta-study of MVHR systems in new housing, Technology Strategy Board

(7) Sunshine, Health and Wellbeing in Housing. AHRC/SFC Knowledge Exchange Programme

(8) Environmental assessment of domestic laundering" EPSRC EP/G00028X/1

1.7. I was a member of the National Institute of Health and Care Excellence (NICE) Public Health Advisory Committee on Indoor Air Quality; and the Royal College of Paediatrics and Child Health working Group on IAQ and children's health.

1.8. I am a member of the Scientific Advisory Group for Emergencies, Environment and Modelling Group and also chaired the Scottish Government Short Life Working group on Ventilation.

1.9. I have also led on a several projects for Scottish Government Building Standards Division, including:

(1) Ability of decentralised mechanical ventilation to act as 'whole-house' ventilation systems in new-build dwellings

(2) To investigate occupier influence on indoor air quality in dwellings

(3) A research project to develop guidance for occupiers on how to live in a low carbon home.

1.10. I am a co-investigator on the Scottish Funding Council (SFC) funded Niddrie Road Passivhaus Tenement retrofit COP26 demonstration project.

Publications

1.11. My relevant publications include:

(1) Sharpe, T., McGill, G., Dancer, S., King, M. F., Fletcher, L. & Noakes, C., (2020) Influence of ventilation use and occupant behaviour on surface microorganisms in contemporary social housing. In: Scientific Reports 8 Jun 2020

(2) Holgate, Stephen, Grigg, Jonathan, Hasan, Arshad, Carslaw, Nicola, Cullinan, Paul, Dimitroulopoulou, Sani, Greenough, Anne, Holland, Mike, Jones, Benjamin, Linden, Paul, Sharpe, Tim, Short, Alan, Turner, Briony, Ucci, Marcella, Vardoulakis, Sotoris, Stacey, Helen, Rossiter, Anna, Arkell, Emily, Hunter, Lindsey, Sparrow, Emma and Orchard, Esta(2020) *The inside story: Health effects of indoor air quality on children and young people.* Technical Report. RCPCH, London.

(3) Dancer, Stephanie, McNally, Louise, McLaren, Janice, McGill, Grainne, Fletcher, Louise, Noakes, Cath and Sharpe, Tim (2018) What is the microbiome of the human home? In: Healthcare Infection Society Conference, 26-28 November 2018, ACC, Liverpool.

(4) Sharpe, Tim, McGill, Grainne, Menon, Rosalie and Farren, Paul (2018) Building Performance and End-user Interaction in Passive Solar and Low Energy Housing Developments in Scotland. Architectural Science Review. ISSN 0003-8628

(5) McGill, Grainne, Sharpe, Tim, Robertson, Lynette, Gupta, Rajat and Mawditt, Ian (2018) Ventilation Performance and Hygrothermal Conditions in New-build UK Housing. In: Indoor Air Conference, 22-27 July 2018, Philadelphia, PA, USA.

(6) Moreno-Rangel, A., Sharpe, T., Musau, F., and McGill, G.: Field evaluation of a low-cost indoor air quality monitor to quantify exposure to

pollutants in residential environments, J. Sens. Sens. Syst., 7, 373-388, https://doi.org/10.5194/jsss-7-373-2018, 2018.

(7) McGill, Grainne, Sharpe, Tim, Oyedele, Lukumon, Keeffe, Greg and McAllister, Keith (2017) An Investigation of indoor air quality in UK Passivhaus dwellings. In: Smart Energy Systems and Buildings for a Sustainable Future. Springer.

(8) McGill, Grainne, Sharpe, Tim, Robertson, Lynette, Gupta, Rajat and Mawditt, Ian (2016) Meta-analysis of indoor temperatures in new-build housing. Building Research & Information. pp. 1-21. ISSN 0961-3218

(9) Sharpe, Tim, Farren, Paul, Howieson, Stirling, Tuohy, Paul and McQuillan, Jonathan (2015) Occupant Interactions and Effectiveness of Natural Ventilation Strategies in Contemporary New Housing in Scotland, UK. International Journal of Environmental Research and Public Health, 12 (7). pp. 8480-8497. ISSN 1660-4601

(10) Sharpe, T. R., et al. "An assessment of environmental conditions in bedrooms of contemporary low energy houses in Scotland." Indoor and Built Environment 23.3 (2014): 393-416.

(11) Howieson, S.G., Sharpe, T. and Farren, P. (2013) Building tight – ventilating right? How are new air tightness standards affecting indoor air quality in dwellings? Building Services Engineering Research and Technology, 35 (5). pp. 475-487. ISSN 0143-6244

2: Overview of involvement in groups between January 2020 and February 2022:

2.1. SAGE Environment and Modelling Group (EMG): April 2020 to June 2022.

2.2. SAGE 57 meeting: 17 September 2020.

3: Summary of documents to which I contributed for the purposes of advising the groups:

3.1. I was initially contacted by Professor Catherine Noakes from Leeds University, with whom I had collaborated on several projects examining ventilation and

health, in March 2020 to ask if I would be interested and available to contribute to a new SAGE sub-group that she had been tasked to put together.

3.2. I attended an initial meeting that discussed the remit and membership and attended SAGE-EMG meetings subsequent to this from 24 April 2020.

3.3. In total, I attended 33 main EMG meetings over this period. I also attended a number of sub-meetings and online calls to discuss and develop papers being prepared by the EMG. Most of these meetings were informal and ad-hoc and were not minuted or recorded.

3.4. I also attended some ad-hoc meetings initiated by GO-Science to assist with dissemination of public advice, for example the 'Hands, Face, Space, Ventilate' campaign in December 2020. All meetings during this period were held online via Zoom, or in some cases Microsoft Teams.

3.5. My role in the EMG was to provide advice and input to the agenda items under discussion at the meetings, and to contribute to papers being prepared by the EMG.

3.6. The primary tasks included the gathering and review of information, academic papers and related literature of relevance to the commissions being set for the group and contributing and editing the papers.

3.7. This included knowledge and review of existing literature, review of new and emerging literature and relevant information from other sources (such as international groups and organisations).

3.8. My area of focus was primarily on aspects of the built environment, in particular the ventilation of buildings. I led on the paper SPI-B/EMG: COVID-19 housing impacts, 10 September 2020 and presented this to the main SAGE 57 meeting on 17 Sept 2020.

4: Summary of documents to which I contributed for the purposes of advising the groups:

4.1. Please see Annex A.

5: Summary of articles, interviews and/or evidence:

5.1. I have been involved in peripheral activity related to aspects of ventilation as result of involvement in SAGE-EMG, for example a Cabinet Office 'teach-in' on ventilation and CO2 on 11 June 2021;

5.2. I have also participated in a Cabinet Office Technical Advisory Panels about lessons that can be learned on 20 Dec 2021 and 16 Feb 2022.

5.3. I was asked to chair the Scottish Government Short Life Working Group (SLWG) on Ventilation which ran between August 2021 and February 2022 and have been asked to chair a subsequent Scottish Government Covid-19 Expert Advisory Group.

5.4. I have been a member of the World Health organisation (WHO) Europe, High Level expert group, advising on ventilation related issues, participating in monthly meetings between 7 December 2021 and 6 October 2022.

5.5. I was asked by the Cabinet Office to participate in some public campaigns on the use of ventilation. This included the Hands, Face, Space, Ventilate campaign in December 2020. This work included some media appearances including press, TV and radio.

5.6. I have been asked to undertake interviews in a personal capacity, mainly for radio and press, relating primarily to ventilation related issues. I do not at present have records of when these took place. However, I can provide the relevant dates if required by the Inquiry.

6: Views as to whether the work of the groups in responding to the Covid-19 pandemic succeeded in its aims.

Composition of the groups

6.1. In my view the EMG had an excellent range of expertise for the tasks in hand. There was also good overlap between related sub-groups, such as SPI-B and SPI-M to provide views on related areas.

6.2. There was on occasion the use of task-and-finish groups which included additional members to examine specific areas.

The way in which the groups were commissioned to work

6.3. My experience was that the EMG group was asked to respond to specific commissions from the Cabinet Office.

6.4. These were generally commissions that were circulated to the group via email or introduced at the group meetings.

6.5. Commonly, potential participants were identified who could contribute specifically or more generally to these, and the papers were developed as shared documents, with interim meetings to discuss specific elements.

6.6. One observation (not necessarily a criticism) is that the commissions were generally asking for an evidence basis, however, given the emerging challenges of the pandemic and lack of 'on-the-ground; evidence, in particular peer reviewed papers or randomised controlled trials, such definite evidence was difficult to establish. This was particularly challenging for aerosol transmission and environmental conditions were difficult to evidence in outbreak settings.

Resources and support

6.7. There were very little resources made available for this work. The secretariat functions provided by GO-Science were excellent, but there was no resource provide for participants to dedicate time to this work, nor to commission work for more detailed investigation.

6.8. All meetings were held online which was very resource efficient (these meetings would not have been practical face to face) and functional.

6.9. There was no central facility for shared documents, so was reliant on the use of participants access to Onedrive, Team, etc.

Advice given and/or recommendations

6.10. The information and papers provided by the group were in my view very robust and thorough, given the changing nature of the pandemic and emerging evidence throughout the period.

6.11. The work of the EMG clearly contributed to emerging knowledge about some aspects of transmission, in particular the role of ventilation and routes for this is built environment settings.

6.12. I believe that the work of the group informed wider guidance and information that was disseminated through other channels, for example, Health and Safety Executive, Chartered Institute of Building Services Engineers.

Working effectively together

6.13. As noted above, I found that the groups worked well together and incorporated a range of views and expertise across different disciplines. The discussion was robust but collegiate, with a spectrum of views being heard and consensus developed.

Extent to which applicable structures and policies were utilised and/or complied with and their effectiveness.

6.14. The group was established very rapidly, and within the operational constraints of online working within which most people were operating. There was a remit established for the group early, and it was chaired very effectively. There were established links between the member, the Chair, the secretariat, and the relevant CSO's. The operational model of responses to commissions seemed to work effectively, with documents produced in very tight timescales.

6.15. It should be recognised that this work was undertaken in the majority of participants own time and on top of day jobs and home working/family life. In my view there was a very strong sense of responsibility and a willingness to 'do your bit'. However, an observation is that this may be based on a somewhat historical view of university funding by Government, which could be called on in times of need, whereas most academic staff time is now funded through student fees and research/KE income.

7: Lessons that can be learned

7.1. I think there was an important separation between the questions being addressed by the group and the policies which were implemented. The work of the experts, whilst acknowledging real-world issues, focussed on the available evidence basis.

7.2. I think there could have been greater resource provided to support participants. This work was largely voluntary and undertaken at evening and weekends and on top of day jobs. Whilst some small support was latterly made available, this was after the event. At the start of the pandemic, I think there was an assumption that this input would be weeks or perhaps months, rather than years.

7.3. The work of the group was focussed on identifying the risks and mitigations in terms of transmission. The group was aware of other harms (health, economic, social) that could occur through some mitigation strategies – these may have been helping in evaluating wider policy decisions but could and should be separate from the sub-groups.

7.4. For me a key aspect was that the evidence provided by the group was science-based and evidence-led in respect of the questions being addressed, and this was crucial as a means of informing later policy and implementation. However, this also tended to mitigate away from a precautionary approach in some cases, especially where there were concerns about absence of evidence, rather than evidence of absence.

7.5. One aspect not anticipated was the degree of public exposure and potential harm. I, I think like most participants, were very willing to contribute and 'do their bit' for the general good but did not anticipate some associate issues such as abuse on social media and phone calls.

8: Documents that I hold

8.1. All documentation I hold are electronic. This includes emails, some containing attachments, and some online shared folders and documents (such as drafts of papers).

8.2. There are also electronic copies of documents held on local drives on my computer. All of these are protected by multiple backups.

Annex A: Professor Timothy Sharpe – List of documents I assisted on as a member of the EMG

EMG: Survival of SARS-CoV-2 in the Environment, 11 May 2020	Link to GOV.UK
EMG: Summary of disinfection technologies for microbial control, 18 May 2020	Link to GOV.UK
EMG: Transmission and Control of SARS-CoV-2 on Public Transport, 18 May 2020	Link to GOV.UK
NERVTAG/EMG: Hand hygiene to limit SARS-CoV-2 transmission, 2 July 2020	Link to GOV.UK
EMG: Measurement of effectiveness of risk mitigation measures in reducing transmission, 16 July 2020	Link to GOV.UK
EMG: COVID-19 - Theatres, concert halls and other performance spaces, 12 July 2020	Link to GOV.UK
NERVTAG and EMG: Role of aerosol transmission in COVID-19, 22 July 2020	Link to GOV.UK
PHE and EMG: Aerosol and droplet generation from singing, wind instruments and performance activities, 13 August 2020	Link to GOV.UK
SPI-B/EMG: COVID-19 housing impacts, 10 September 2020	Link to GOV.UK
SPI-B/EMG: COVID-19 housing impacts, 10 September 2020	Link to GOV.UK
EMG: Processing methods to facilitate the re-use of personal protective equipment (PPE), 8 September 2020	Link to GOV.UK
SPI-B/EMG: COVID-19 housing impacts - evidence review, 10 September 2020	Link to GOV.UK
NERVTAG/EMG: Duration of wearing of face coverings, 15 September 2020	GOV.UK Link
EMG: Role of ventilation in controlling SARS-CoV-2 transmission, 30 September 2020	GOV.UK Link
EMG: Simple summary of ventilation actions to mitigate the risk of COVID-19, 1 October 2020	Link to GOV.UK
EMG: Potential application of air cleaning devices and personal decontamination to manage transmission of COVID-19, 4 November 2020	Link to GOV.UK
EMG/SPI-B: Mitigating risks of SARS-CoV-2 transmission associated with household social interactions, 26 November 2020	GOV.UK LINK

EMG/SPI-B/TWEG: Mitigations to reduce transmission of the new variant SARS-CoV-2 virus, 22 December 2020	Link to GOV.UK
EMG/SPI-B/SPI-M: Reducing within- and between-household transmission in light of new variant SARS-CoV-2, 14 January 2021	Link to GOV.UK
EMG: Application of physical distancing and fabric face coverings in mitigating the B117 variant SARS-CoV-2 virus in public, workplace and community, 13 January 2021	Link to GOV.UK
EMG: COVID-19 risk by occupation and workplace, 11 February 2021	Link to GOV.UK
EMG Transmission Group: COVID-19 transmission in prison settings, 25 March 2021	Link to GOV.UK paper
HOCI and EMG: Masks for healthcare workers to mitigate airborne transmission of SARS-CoV-2, 25 March 2021	Link to GOV.UK paper
EMG Transmission Group: Insights on transmission of COVID-19 with a focus on the hospitality, retail and leisure sector, 8 April 2021	Link to GOV.UK paper
EMG and DCMS: Science framework for opening up group events, 16 March 2021	Link to GOV.UK paper
EMG, SPI-M and SPI-B: Considerations in implementing long-term 'baseline' NPIs, 22 April 2021	Link to GOV.UK paper
EMG and SPI-B: Application of CO2 monitoring as an approach to managing ventilation to mitigate SARS-CoV-2 transmission, 27 May 2021	Link to GOV.UK
EMG/Transmission Group/SPI-B: COVID-19 Transmission in Hotels and Managed Quarantine Facilities (MQFs), 9 September 2021	Link to GOV.UK paper
SPI-B, SPI-M and EMG: Considerations for potential impact of Plan B measures, 13 October 2021	Link to GOV.UK paper
EMG and NERVTAG: Update on transmission and environmental and behavioural mitigation strategies, including in the context of Delta, 13 October 2021	Link to GOV.UK paper
EMG and SPI-B: Non-Pharmaceutical Interventions (NPIs) in the Context of Omicron, 15 December 2021	Link to GOV.UK paper
EMG Transmission Subgroup: Consensus statement on SARS-CoV-2 transmission risk at festivals, 23 December 2021	Link to GOV.UK paper
EMG: Role of screens and barriers in mitigating COVID-19 transmission, 1 July 2021	Link to GOV.UK