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This document is the ACAN guidance for responses to the Combustible Materials Consultation. It has been written by members of the respective ACAN campaign group, following reviews of scientific and professional guidance, and the TTF response.

When submitting responses, it is important to personalise answers.

The deadline for consultation responses is the 13th April.

Consultation document:

https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/859300/Combustible_Ban_ConDoc.pdf

Consultation survey:

https://www.surveymonkey.co.uk/r/CombustibleBan

Question 3a

Do you agree that hotels, hostels and boarding houses should be included in the definition of relevant buildings in Regulation 7(4)?

YES

NO

DON'T KNOW

Whilst we have elected to answer 'don't know' to this question, we have considered the following references and arguments pertinent to the resolution of this consultation, and we include them here for consideration by MHCLG.

The uses of a building should be taken as one of many factors to consider in developing a risk-based fire safety strategy. When designing hotels, hostels and boarding houses, it is important to be aware that multi-occupancy residential buildings risk greater potential impacts associated with fire compared to offices, shops and restaurants due to their occupancy patterns. The Hackitt Review notes that the rate of fatalities in hospitals and hotels/hostels are roughly a

third of those in residential properties[1]. It also notes that *"more generally, fire fatality risk is primarily associated with demographics and behaviour rather than type of building*" highlighting the importance of holistic (risk-based) approaches.

The Architects Climate Action Network (ACAN) endorse and advocate for the use of independent professionally trained fire risk assessors, as regulated by the government and those registered with the Institute of Fire Risk Assessors. Professional Fire Risk Assessors are qualified to consider how buildings are designed, used, occupied, made and where they are sited and develop fire strategy with respect to all these factors holistically. This approach then leads to fire strategies being developed, where height is one of many factors considered as part of wider strategy. This is what we would consider a risk-first approach - reviewing all potential risks and developing strategy.

It may be that a balance is required between risk-based analysis and compliance, and that both serve their purposes to the construction industry, especially in the meantime if more robust risk-based methodologies are developed.

As a consequence of these reasons, We are unable to answer one way or the other.

Question 3b

Should any other building types be included within the scope of the ban?

YES

NO

DON'T KNOW

Whilst we have elected to answer 'don't know' to this question, we have considered the following references and arguments pertinent to the resolution of this consultation, and we include them here for consideration by MHCLG.

ACAN welcomes more robust, appropriate regulations to protect building occupiers today. Whilst aware of the importance of compliance-based methodologies, as indicated in our response to Q3a, we support the adoption of an independent risk-based approach i.e. a professional fire risk assessment undertaken during the design stage by a suitably qualified professional. This approach facilitates addressing concerns of specific building types, and also for mixed-use schemes with complex interfaces between uses and risks.

Question 4a

Do you agree that the height threshold of the ban should be reduced to at least 11m and above?

YES

NO

DON'T KNOW

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1 https://www.gov.uk/government/publications/independent-review-of-building-regulations-and-fire-safety-final-report

Question 4b

Is there another lower height threshold that should be considered? Please provide evidence.

Whilst we have elected to answer 'don't know' to this question, we have considered the following references and arguments pertinent to the resolution of this consultation, and we include them here for consideration by MHCLG.

As has been outlined in our response to 3a, ACAN would advocate for fire strategies to always be developed in the round, taking into account a multitude of factors, including height. Regarding building height, the Scottish Building Standards established that it is above 11m that firefighters are presented with a risk to applying a water jet from the ground[2]. To develop solutions for taller buildings, it becomes even more important that this holistic strategic approach is taken, as escape routes become potentially longer.

We would also encourage this research project to include a review of built examples of timber structures in the UK together with the architects, fire risk assessors and fire engineers who worked on these projects, to understand what fire strategies have been employed, as well as examples from abroad, where different standards have led to different solutions.

In response to the current combustibles ban, there has been widespread confusion in the architecture industry, as well as the wider supply chain and the insurance industry. In particular, due to the lack of distinction between combustible cladding and primary structure[3] in external walls, the 2018 ban on combustible materials[4] has had significant effects on the design and delivery of mass-timber structures[5].

This is of concern to the architecture industry as whilst responding to the Grenfell Tragedy the industry is simultaneously grappling with the twin crises of Climate and Biodiversity breakdown and working towards more regenerative practices.

ACAN believes that it is therefore imperative that the ban specifically seeks to target combustible cladding only, as distinct from primary structure in external walls as recommended by the RIBA[6] and adopted by Scottish Regulations[7], and instead mandates a fire safety engineered strategy to demonstrate adequate fire protection of primary structural timber in external walls.

Further concern around a prescriptive ban approach came from London Fire's technical response to the 2019 consultation, where they said the ban 'is dealing with a symptom but not providing the cure', and expressed the limitations of using height as a defining factor for fire safety without considering perimeter access. This view has precedent in the form of Margaret Law's 1994 paper at the International Association of Fire Safety Science "2 Magic Numbers and Golden Rules" which railed against arbitrary prescriptions in saying "when there are simple and arbitrary rules there are always more arguments and disputes than when an engineering approach is adopted,

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[2] https://www.gov.scot/publications/building-standards-technical-handbook-2019-domestic/

[3] https://www.architecture.com/knowledge-and-resources/knowledge-landing-page/combustible-materials-ribas-position-explained

[4] https://www.gov.uk/government/news/government-bans-combustible-materials-on-high-rise-homes

[5] https://www.architectsjournal.co.uk/news/newham-hires-architect-to-replace-timber-with-concrete-on-drmm-scheme/10046243.article

[6] https://www.architecture.com/knowledge-and-resources/knowledge-landing-page/riba-calls-for-a-comprehensive-ban-on-combustible-materials

[7] https://www.gov.scot/publications/building-standards-technical-handbook-2019-domestic/

because the underlying technical assumptions are forgotten or not understood."[8] These concerns are substantiated by the findings of the Hackitt Review which advised against a prescriptive ban.

Question 4c

Do you agree that an appropriate research project regarding building risk should be carried out to inform further review of the scope of the ban?

YES

NO

DON'T KNOW

NB: WE HAVE ELECTED NOT TO RESPOND TO QUESTIONS 5 TO 6

Question 7a

Which components, if any, do you consider should no longer be included in the list of exemptions in Regulation 7(3) and why?

We believe that exemptions should be made principally on the grounds of fire safety, ahead of considerations of cost and sequencing. This may result in the need for developing and establishing a robust methodology (for example in accordance with BS8414) to be put in place in order to enable the testing of full wall assemblies in order to inform an exemption list.

Question 7b

Which additional components, if any, should be included on the list of exemptions in Regulation 7(3) and why?

We believe that primary structure, including structural timber with adequate fire protection and when tested to BS 8414 using full-scale systems, should be exempt from the ban. This is because timber construction has been shown to perform as well as other construction under fire testing[9]. This exemption would give designers and engineers the ability to demonstrate a design's fire performance and would be similar to the strategies of other countries such as the US and Canada. Further and future research and innovation is likely to improve our understanding of timber structures and make their use more viable for more building typologies and heights. The proposed ban would discourage research and innovation in structural timber, a material that is pivotal in the essential efforts to mitigate climate change. As highlighted in a recent research report on timber construction by Arup:

"*Cleary in some cases it may not be possible to build safely using current knowledge and understanding; in which case further research or alternative approaches should be determined in order to achieve the project's overall objectives.*"[10]

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[8] https://iafss.org/publications/fss/4/79/view/fss_4-79.pdf
[9] http://www.benfieldatt.uk/information-zone/timber-frame-information-zone/fire-performance-of-timber-frame
[10] Re-thinking Timber Buildings, Arup, March 2019. Page 69

NB: WE HAVE ELECTED NOT TO RESPOND TO QUESTIONS 8 TO 13

Question 14a

Please provide any additional evidence on costs, risks and benefits which should be considered in an assessment of impacts of this consultation.

ACAN's Interest

The Architects Registration Board's Code of Conduct requires all architects to consider both the direct and indirect societal consequences of their work in the built environment. We are not fire engineers and believe that fire engineers and structural engineers are better suited to contribute towards most aspects of this consultation. None-the-less, we believe that as key professionals within the construction industry, architects have a very meaningful contribution to make to this consultation. We unreservedly support stronger safety measures for buildings and support the ban's objectives of achieving safe buildings. However, we fear that the proposed ban, that would include primary structure in external walls, would unnecessarily hinder the industry's ability to deliver low carbon buildings, and restrict efforts to meet the government's net zero 2050 commitment. This is why ACAN is responding to this consultation, and strongly recommending that suitably designed and delivered primary structures[11] within external walls, including structural timber, are exempt from the proposed ban.

Fire Safety Tests

A critical issue with the proposed ban on combustible materials in its current form that has caused confusion amongst the industry is that it does not differentiate between cladding elements and load-bearing primary structure in external walls. This issue was voiced in 2018 by the Royal Institute of British Architects, whose key recommendation to the MHCLG was that "*the ban should not include the buildings' primary structure*" and *"should have adequate fire protection"*[12]. The Scottish Building Regulations[13] accepted guidance cannot cover all types of innovative or new methods of construction, citing engineered timber as one example, and therefore regulations should allow for demonstration of compliance. The Scottish Building Regulations endorse that '*it is reasonable to demonstrate compliance with the functional standards by alternative means*' through a holistic approach, categorically requiring engagement with fire engineers, resulting in important and beneficial fire safety engineered solutions.[14] In contrast to an all-out ban, a fire safety engineered approach would offer a more rigorous management of the risk of fire in our future buildings. As outlined in response to question 7A,

11 https://www.architecture.com/knowledge-and-resources/knowledge-landing-page/combustible-materials-ribas-position-explained:

12 https://www.architecture.com/knowledge-and-resources/knowledge-landing-page/combustible-materials-ribas-position-explained

13 https://sp-bpr-en-prod-cdnep.azureedge.net/published/2017/11/3/Scottish-Building-Standards-and-Fire-Safety--A-Brief-Overview/SB%2017-73.pdf

14 https://www.gov.scot/publications/building-standards-technical-handbook-2019-non-domestic/about/

developing this methodology may take time; and therefore temporary measures may be required until they are ready for adoption.

This progressive stance should be seen by the UK as a leading example to learn from. Following a six-storey timber frame full-scale fire test where compartmentation and building integrity was maintained, TRADA and BRE fire safety research concluded that *"timber frame performs as well as other construction in fire*".[15]

The proposed ban should also be reviewed in light of the recent announcement by the MHCLG for the introduction of mandatory sprinklers for new residential buildings over 11m[16]. This strengthens the case for a more holistic focus on fire risk engineering strategies.

"Automatic sprinkler systems are designed to control or suppress a fire in its growth stages and before it reaches a size which is a threat to the structure. They can therefore contribute to reducing the risk of structural failure, as is the case for all types of construction.

However, where they are not able to do so the structure must achieve the required fire resistance performance for occupant and firefighter life safety. These considerations have led to a renewed impetus in timber fire engineering research."[17]

This impetus in timber fire research would be significantly curbed by an outright ban on structural timber.

It is also worth noting that every structural material irrespective of whether they are classified as combustible or not, including steel and concrete, are affected by fire. Arup has emphasised this point in a recent report on timber construction:

"Best practice for fire safe design, regardless of material used, is to design knowingly using evidence from research, testing and validated methods of calculation. This allows specific risks to be defined and quantified and appropriate fire safety provisions made as part of a holistic design strategy."[18]

Inhibiting the UK's Net Zero Target

ACAN are concerned by the implications of this proposed ban, with regards to its inclusion of primary structure, on the UK's ability to mitigate the Climate Emergency we face, and to ensure the UK meets its Climate Commitments.

The industry and the Committee for Climate Change (CCC) are united in the assertion that designing building structures to include timber is a vital part of the solution to mitigate the Climate Emergency. The (super) structure of buildings can be responsible for up to 46%[19] of the total embodied emissions associated with the construction of a building. Engineered timber, which can be used in it's structural form as Cross Laminated Timber (CLT) or Laminated Veneer Lumber (LVL), has a much lower embodied carbon than other commonly used structural materials or systems, including concrete, steel & masonry.[20] Research has shown that replacing masonry

[15] http://www.benfieldatt.uk/information-zone/timber-frame-information-zone/fire-performance-of-timber-frame
[16] https://www.pbctoday.co.uk/news/building-control-news/building-safety-measures/74346/
[17] Re-thinking Timber Buildings, Arup, March 2019. Page 67
[18] Re-thinking Timber Buildings, Arup, March 2019. Page 69
[19] Source: Page 26, LETI Embodied Carbon Primer, 2020
[20] https://www.circularecology.com/embodied-energy-and-carbon-footprint-database.html#.XoZ1rYhKg2w

structure with a timber frame at the individual building level can reduce embodied CO2e emissions by 20%, increasing to approx 60% when substituting concrete structures with CLT[21].

Furthermore, the use of biogenic materials in construction, such as timber, can sequestre large amounts of carbon from the atmosphere, storing it within the building for as long as it stands, and beyond. In using timber for the primary structure of a building,instead of concrete, the total sequestered carbon in the structure can increase by 400%[22].

A report commissioned by the CCC[23] compares the carbon abatement potential of various timber growth scenarios in UK construction. It concludes:

"Increasing the quantity of wood used in construction presents a significant opportunity to reduce GHG emissions. While reduction of embodied carbon within buildings can be achieved through various measures, an increase in stored sequestered carbon can only be achieved by increased use of biomass based materials such as timber."

Specifically on the use of structural timber alone (not cladding) they calculate the following carbon abatement potential in the residential sector:

"Considering the residential sector alone, the total additional annual abatement resulting from the high UK timber construction scenarios compared to a no growth counterfactual is ~2.2 Mt CO2e p.a. Approximately half of this comes from a reduction in embodied emissions and half from an increase in sequestered carbon."

This abatement is roughly equivalent to the embodied carbon of building 28,000 new homes,[24] or around 10% of the Government's annual targets for new homes.[25] As advised by the CCC,[26] the UK Government should enact new policies to encourage the growth of the UK's timber manufacturing industry and sawmill capacity. Research has shown that in developed regions, "*substantial amounts of wood can be harvested without depleting or degrading forest resources*" [27] and developed regions have managed the extraction of 75 billion cubic metres of logs since 1990 whilst increasing forest cover by almost 1 million hectares a year.[28].

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21 https://www.theccc.org.uk/publication/wood-in-construction-in-the-uk-an-analysis-of-carbon-abatement-potential-biocomposites-centre/

22 https://www.theccc.org.uk/publication/wood-in-construction-in-the-uk-an-analysis-of-carbon-abatement-potential-biocomposites-centre/

23 https://www.theccc.org.uk/publication/wood-in-construction-in-the-uk-an-analysis-of-carbon-abatement-potential-biocomposites-centre/

24 Berners-Lee, M. 2010 - *How bad are bananas: A house p.149.* (80 tonnes CO2e for a new 2-bedroom cottage built to 2008 Scottish Building Regulations or Code for Sustainable Homes Level 5)

25 https://www.independent.co.uk/news/business/news/new-homes-government-target-300000-royal-institution-of-chartered-surveyors-12-per-cent-a8187911.html

26 https://www.theccc.org.uk/publication/biomass-in-a-low-carbon-economy/: *"MHCLG should develop new policies to support a substantial increase in the use of wood in construction"*

27 https://www.sciencedirect.com/science/article/pii/S1364032116306050

28 FAO. FAOSTAT dataset. Food and Agriculture Organization of the United Nations; 2015.

This support would not only result in improvements in forestry management but also an increased timber production would reduce the UK's greenhouse gasses associated with the importation of timber.

"A high-level estimate for moderate timber growth suggests that 86% of the emissions savings achieved would be attributable to UK carbon budgets, while 91% of emissions savings would be attributable to the UK under high timber growth scenarios." [29]

If the UK were to ban the use of all combustible material in external walls over 11m then adequately fire protected structural timber in these instances would be banned and the UK would be severely inhibited in reaching its net zero target, as CLT/mass timber structures represent the primary route to reducing the embodied carbon of buildings at the scale required.

Inhibiting the UK's Housing Targets

A report by the All-Party Parliamentary Group for the Timber Industries[30] found that if 270,000 new homes were built from timber then this would equate to 30% quicker build times, a 90% reduction in waste due to off-site construction and 3 million tonnes of carbon dioxide absorbed and stored through sequestration. The proposed ban of all combustible materials within or on external walls would include forms of fire-engineered structural timber construction - even if adequately fire protected. This would severely limit the government's ability to employ the APPG's findings in order to meet its own aims with regards to home building: achieving high quality, fire-safe housing, reaching zero carbon, and creating better places. As mentioned before, we unreservedly support stronger safety measures for buildings and support the ban's objectives of achieving safe buildings. In order to meet these three aims however, structural timber, with adequate fire protection, is the only viable option, in contrast to steel and concrete, to build at the scale required to meet the government's housing targets of 300,000/year.

These findings match with the experience of architects who have built using modular structural timber systems such as CLT, with Anthony Thistleton, who's practice Waugh Thistleton Architects built one of the UK's largest CLT projects, Dalston Lane, concluding that "*this building material also builds buildings beautifully, it builds them quickly, it builds them inexpensively, it builds them quietly, it builds them with fewer deliveries to site*".[31] All of these benefits are offered, while also reducing waste and carbon emissions. The off-site capabilities of modular structural timber construction ensures that the buildings created can be of consistent and assured high quality, while significantly increasing the productivity of the construction industry through the introduction of off-site industrial processes in controlled environments, in place of on-site work. As has been previously discussed and advised by the CCC, timber structures are an essential existing route to net zero embodied carbon within construction (without offsetting), and are therefore vital to meeting the government's net zero target.

A major developer cost comparison analysis of CLT (cross laminated timber) vs RC (reinforced concrete) structure for a 7 storey building containing 251 residential units found an overall CLT

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29 https://www.theccc.org.uk/publication/wood-in-construction-in-the-uk-an-analysis-of-carbon-abatement-potential-biocomposites-centre/

30 https://ttf.co.uk/how-the-timber-industries-can-help-solve-the-housing-crisis/

31 https://www.theb1m.com/video/dalston-lane-the-worlds-largest-timber-building

cost saving of 4% (a saving of £75 / sqm) compared to RC[32]. These savings came primarily from savings in management time costs, site set up and consumables, representing £751,000 in savings, in addition to £270,000 in superstructure savings. Further to these cost savings, the comparison analysis found that CLT structure demonstrated 700 fewer deliveries to site, "presenting a massive local social impact improvement", and an overall carbon footprint reduction circa 10,000mt (including -2,000mt from a 27% reduction in piles). This CLT vs RC structure analysis supports the findings of other architects who have worked on CLT projects, such as Waugh Thistleton Architects who's 33.8m-tall 121-home residential Dalston Lane project utilised CLT for the super-structure. It achieved similar benefits including circa 600-fewer lorry deliveries, a 50% saving in embodied carbon, and a 230% saving in net carbon assuming sequestration[33].

UK research and investment

The UK has been a world leader in the research and development of mass timber structures, with world class facilities dedicated to CLT development, such as Ramboll's Cambridge facility. These engineered timber structures traditionally rely on fire-protected combustible material within the external wall and would therefore be at risk of this ban in certain instances. Alongside material development, the UK has also led the way with architectural case studies from across the country that have proven the considerable time and waste savings associated with timber structures. These benefits, alongside the lower embodied carbon that led the CCC to cite timber construction as key to meeting our carbon reduction targets[34], have led to a surge in interest in the potential of timber structures in the UK and beyond from architects, developers, housing associations and councils, leading to some areas of the country including Wales and Hackney introducing 'wood first' or 'wood encouragement' policies[35]. If the proposed combustible ban were to incorporate structures within external walls, including timber structures that have sufficient fire protection, then the UK will have denied its own opportunities of capitalising on this existing research, investment and reputation.

Other countries are recognising the vital importance of timber structures in combating climate change, and as a key building material of the future: "*We often draw a parallel with the growth of concrete and reinforced concrete in the 20th century. When you look at the trajectory of innovation and architecture that emerged in the concrete age, we are only just at the beginning of the timber age and there is still a huge amount to achieve" - Anthony Thistleton in Construction Manager Magazine - 30th January 2019*

This proposed ban of combustible materials in or on external walls over 11m, including primary structure[36] such as engineered timber with adequate fire protection, comes as other countries actively embrace the carbon abatement potential of large timber structures by introducing wood prioritisation policies. France recently announced that publicly-funded buildings must be constructed from at least 50% timber or other bio-based materials. Concurrently, the height potential of these materials is being pioneered, for example in Norway where the world's tallest

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[32] Source: Page 1, CLT Vs RC Concrete Frame_CHC presentation high point summary, 2019
[33] https://www.bkstructures.co.uk/our-services/products/clt
[34] https://www.theccc.org.uk/publication/biomass-in-a-low-carbon-economy/y
[35] http://greenbuilding.co.uk/hackney-lead-the-way-on-timber-building/
[36] https://www.architecture.com/knowledge-and-resources/knowledge-landing-page/combustible-materials-ribas-position-explained:

timber building was recently completed at 85.4m. The UK has played a leading role in researching and developing structural timber, with other countries building off this investment. The inclusion of primary structures[37] constructed using fire-protected engineered timber within the proposed ban over 11m will effectively halt and render this investment redundant at a meaningful scale. The industry has already witnessed the impacts of this on current projects such as for Newham Council where an engineered timber structure is being substituted with a concrete structure.[38]

As mentioned in response to 7B, further research and innovation will continue to improve our understanding of best utilising timber structures. As highlighted in a recent research report on timber construction by Arup:

"*Cleary in some cases it may not be possible to build safely using current knowledge and understanding; in which case further research or alternative approaches should be determined in order to achieve the project's overall objectives.*"[39]

ACAN agrees with Question 4c that an appropriate research project regarding building risk should be carried out to inform further review of the scope of the ban, and that subsequent to such research and testing, the evidence may require the Building Regulations to consider further amendments.

Question 14b

Are you aware of any particular equalities impacts for these proposals? How could any adverse impact be reduced and are there any ways we could better advance equality of opportunity or foster good relations between people who share a protected characteristic and those who do not? Please provide evidence to support your response.

The Government must ensure that all new regulations and changes to regulations are developed with respect to the climate emergency, one of the greatest threats to humankind's safety this planet will face this century. We would strongly advocate for these regulation changes to be developed with respect to the important work the CCC is doing to inform its recommendations to the Government.[40]At the recent Court of Appeal decision on the Heathrow Expansion Project, we witnessed the significant risk of failing to adequately consider and respond to the environmental impacts of proposals and the Climate Change Act.[41]

It is well-known that the climate emergency affects the most disadvantaged members of our communities, many of whom fall within the protected characteristics. In developing fire safety regulations with respect to the CCC's recommendations and the climate and biodiversity emergencies, there is an inherent equality benefit if developed with the climate in mind. In particular, the youngest generations in our society who are less able to speak for themselves at

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37 https://www.architecture.com/knowledge-and-resources/knowledge-landing-page/combustible-materials-ribas-position-explained:

38 https://www.architectsjournal.co.uk/news/newham-hires-architect-to-replace-timber-with-concrete-on-drmm-scheme/10046243.article

39 Re-thinking Timber Buildings, Arup, March 2019. Page 69

40 https://www.theccc.org.uk/publication/biomass-in-a-low-carbon-economy/

41 https://www.bbc.co.uk/news/explainers-51646562?intlink_from_url=https://www.bbc.co.uk/news/topics/c48yr98919yt/heathrow-airport-expansion&link_location=live-reporting-story

present are those who will be most disadvantaged if we develop systems that do not radically improve the status quo.

If fire safety regulation changes are developed independently of the current climate emergency, we are potentially locking ourselves into a built environment that puts the future generations of the UK, and beyond, at risk of significant threats to health and safety caused by climate change. The research cited in the answers above show that it is possible to build safe structural timber buildings now that also help towards reducing our national carbon emissions, whilst making healthier, better places to live, work and play. If the regulations can be developed to take into account the guidance above from industry leaders from architecture, engineering, fire safety as well as environmental regeneration, circular economy, sustainability, and energy leaders, we can have hope that the changes will be of benefit to society as a whole.