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# A Comparison of Government Communication of Climate Change in Hong Kong and United Kingdom

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**ABSTRACT:** As leaders of civil society, governments have a prime responsibility to communicate climate change information in order to motivate their citizens to mitigate and adapt. This study compares the approaches of the U.K. and Hong Kong governments. Although different in size and population, the United Kingdom and Hong Kong have similar climate change agendas to communicate to similarly educated and prosperous populations. The study finds that while both governments use similar means: policy, education, campaigns, internet, and social media, these have different characteristics, with different emphases in their climate change message. The United Kingdom's top-down approach is more prominent in its legally binding policy and well-defined programs for adaptation and risk assessment. Hong Kong has more effectively embedded climate change education across the school curricula and has a more centralized and consistently branded campaign, with widespread use of visual language to connect the public to the problem. Hong Kong frames climate change as a science–society problem and has a greater focus on self-responsibility and bottom-up behavioral change. Thus, the U.K. and Hong Kong governments have polarized approaches to motivating their citizens into climate action. Moving forward, both governments should consider best practice elements of the other to develop their communication of climate change.

**SIGNIFICANCE STATEMENT:** Governments have a key responsibility to communicate information about climate change in order to raise public awareness about the risks of climate change and also to motivate actions and change beliefs. This article compares the different approaches of the U.K. and Hong Kong governments in terms of policy, reports, education, campaigns, and social media. It finds that the United Kingdom has prominent adaptation and risk assessment programs mandated by policy, whereas Hong Kong has more effectively embedded climate change education in the school curricula and has a more centralized and consistently branded campaign with increased focus on self-responsibility and behavioral change. Both governments must evaluate their communication approaches to show effective leadership and response to the “climate emergency.”

**KEYWORDS:** Social Science; Communications/decision making; Climate change; Policy

## 1. Introduction

In 2018 and 2019, climate change was brought to fore by the global youth strikes for climate initiated by Greta Thunberg, the civil protests by environmental movements such as Extinction Rebellion, and campaigning by other international influencers such as Sir David Attenborough. In the context of this increased public awareness of climate change, this study examines climate change communication by the U.K. and Hong Kong governments. Arguably, as leaders of their nations, governments have the prime responsibility to communicate climate change in order to raise public awareness of future risks and also motivate actions and change beliefs (Bingham 2007). Indeed, without the actions of individuals (e.g., to insulate their homes or to travel less by private car) and organizations (e.g., to reduce their carbon emissions or develop climate adaptation strategies) within their country or region, a government will be unable to meet international targets such as the 2016 Paris Agreement or achieve national, regional, and local ambitions to reduce carbon emissions or become climate resilient.

In the past decade, climate change communication has developed as a branch of multidisciplinary academic research (Ballantyne 2016; Moser 2016). Previous studies have examined the communicators including local governments, scientists, celebrities, and the media (e.g., Albright et al. 2020; Anderson 2011; Corner et al. 2018; McLoughlin et al. 2018); the audiences and public perceptions of climate change (e.g., Brechin and Bhandari 2011; Levine and Kline 2017; Ojala 2012; Pearson et al. 2017; Porter et al. 2015; Wang and Zhou 2020; Wibeck 2014); and the theories, frames, and paradigms supporting their communication approaches (see reviews by Ballantyne 2016; Ponce de Leon and Gotangco 2018). However, despite a global increase in climate action including more than 1500 climate laws and policies worldwide (Nachmany and Setzer 2018), there has been little consideration of the communications approach of national governments, or cross-country or cross-culture comparisons, a gap noted by Moser and Dilling (2007) and Moser (2016) and notable by its absence from the comprehensive *Handbook of Climate Change Communication* edited by Leal Filho et al. (2018a,b,c).

Addressing this gap, this study compares the modes and content of climate change communication by the governments of the United Kingdom and Hong Kong. Although the United

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TABLE 1. Comparing the context for government communication of climate change in the United Kingdom and Hong Kong (references for the different sources are shown in parentheses).

	United Kingdom	Hong Kong
Size (U.N. Statistics Division)	241 930 km <sup>2</sup>	1106 km <sup>2</sup>
Population ( <a href="#">World Population Review 2020</a> )	67 886 011	7 496 981
High income (gross national income exceeding \$12,056; <a href="#">World Population Review 2020</a> )	Yes	Yes
CO <sub>2</sub> emissions per capita (global average 4.7 t)	5.84 t	5.81 t
CO <sub>2</sub> consumption per capita ( <a href="#">Ritchie 2018</a> )	8.5 t	16.5 t
Population aware of/know a lot about global warming	97%	92%
Population consider global warming to be a personal threat ( <a href="#">Pugliese and Ray 2009</a> )	69%	54%
Observed climate change ( <a href="#">ENB 2015</a> ; <a href="#">HKO 2015</a> ; 2019; <a href="#">Kendon et al. 2019</a> ); <a href="#">Welford 2008</a> )	<p>Twenty-first century warmer than previous three centuries</p> <p>10 warmest U.K. years since 2002</p> <p>Decrease in No./severity of snow events</p> <p>Recent winter and summer are wetter</p>	<p>Increase in mean temperature of 1.6°C (1885–2015)</p> <p>Increase in hot days and nights</p> <p>Reduction of cold days</p> <p>Sea level rise of 31 mm decade<sup>-1</sup> (1954–2018)</p>
Risks from future climate change ( <a href="#">Defra 2017</a> ; <a href="#">ENB 2015</a> )	<p>Sea level rise of 1.4 mm yr<sup>-1</sup> since 1900</p> <p>Increase in rainfall on very wet days</p> <p>Flooding and coastal change are risks to communities, business, and infrastructure</p> <p>Risk to health, well-being, and productivity from high temperatures</p> <p>Public/agriculture water shortages</p> <p>Risks to natural capital</p> <p>Risks to domestic and international food supply</p> <p>Impact of emerging pests, diseases, and nonnative species on people and plants</p>	<p>Increase in total and extreme rainfall</p> <p>More frequent and destructive cyclones</p> <p>Negative impact on biodiversity</p> <p>Extreme weather and flooding risk to built environment and infrastructure; increasing maintenance/insurance costs</p> <p>Increased energy demand for cooling</p> <p>Water shortages</p> <p>Negative impact on local food production</p> <p>Health impacts from higher temperatures and changed transmission of infectious diseases</p>
Climate change opportunities ( <a href="#">CCC 2016</a> ; <a href="#">ENB 2015</a> )	<p>Reduced cold-related deaths</p> <p>Increased outdoor activities</p> <p>Economic opportunities for adaptation-related goods/services</p> <p>Longer growing season and increased agricultural productivity (if water, soil, and pests are managed sustainably)</p>	<p>Jobs from low-carbon sectors</p> <p>Smarter and greener city and buildings</p> <p>Better health and ecosystem, recreation, and social cohesion</p>

Kingdom and Hong Kong are different in terms of size and population, they have similar climate change agendas to communicate to similarly educated and prosperous populations (see [Table 1](#) and references there in). For example, both United Kingdom and Hong Kong are high-income countries/regions, with above global average carbon emissions per capita. They have similar education systems, and highly educated populations that are aware of global warming ([Lee et al. 2015](#)). Both the United Kingdom and Hong Kong have well-regarded government funded meteorological institutions, namely, the Met Office and Hong Kong Observatory (HKO), which have studied the physical observations of climate change within each country/region. Both

governments have identified future climate change risks and opportunities ([Table 1](#)). Last, both the United Kingdom and Hong Kong are signatories to the 2016 Paris Agreement; Hong Kong has acceded to the Paris Agreement as an administrative region of China [Environment Bureau ([ENB](#)) 2017] but has autonomy to implement its own measures ([Mayer 2017](#)). Both countries have therefore committed to global collaborative action to prevent dangerous climate change and keep warming below 2°C above preindustrial levels.

To meet their global and national climate change ambitions both governments will need to communicate climate change information clearly and effectively to their citizens to motivate individuals and organizations to mitigate and adapt. Instigating

citizen action on climate change requires overcoming the paradox of climate inaction, namely, that in spite of the overwhelming evidence for urgency with which we need to take climate actions (e.g., IPCC 2018), “knowledge itself is insufficiently motivating to take action” (Moser 2016, p. 351). Naustdalslid (2011) characterizes climate change as a “modern environmental problem” and theorizes six paradoxes at the interface between nature and society that illuminate the reasons for inaction. These provide a framework to analyze the modes and content of climate change communication from the U.K. and Hong Kong governments and explore whether communication efforts by the governments address or deepen this paradox. Accordingly, this comparative study examines the following research questions within the theoretical context provided by Naustdalslid (2011): (i) How do the governments communicate climate change? (ii) How do the messages and methods differ between the United Kingdom and Hong Kong? (iii) What can be suggested to improve their communication of climate change? It draws on previous studies of best practice in climate communication (e.g., Corner et al. 2018; McLoughlin et al. 2018; Richards and Den Hoed 2018; Schweizer et al. 2009) to provide practical recommendations to respective governments. In doing so, this cross-national and cross-cultural comparison enhances existing studies of climate change communication and discusses future steps for expanding this research.

## 2. Communicating climate change

Communication can be face to face or mediated, using three modes: written, verbal, or nonverbal language (Moser 2010). For governments, through their designated secretaries and departments, climate change can be communicated through policies, plans, projects, stakeholder consultation, participation in national and international forums and agreements, public outreach activities, and school curricula (Anup 2018). The type of communication mode used depends on the message, time, space, cost, number and type of recipients, and effectiveness including reliability, speed, and efficiency (Moser 2010; Sanina et al. 2017); although one-way communication typically predominates rather than more engaging dialogic or participatory approaches (McLoughlin et al. 2018). Communicating climate change information with lay audiences can be challenging because climate science contains uncertainties, abstract statistics, and intangible knowledge, which may not be understood or personally relatable (Corner et al. 2018). Simply providing data and facts does not stimulate a public response despite scientific evidence being the heart of climate communication (Korte 2016; McLoughlin et al. 2018). Apart from the complexity and uncertainty of science, ineffective communication of climate change can make the topic feel distant, unreal, or delayed, and the audience uninterested, unwilling, or limited to improve the situation (Moser 2010).

In addition to conveying information and raising awareness, the ultimate purpose of climate change communication is to motivate actions and change beliefs (Moser and Dilling 2007). This is particularly pertinent for governments for without the actions of individuals (e.g., to reduce personal emissions of

greenhouse gases) and organizations (e.g., make infrastructure resilient to extreme weather) a country cannot meet net-zero targets or adapt to minimize the impacts of climate change on society or economy. Previous research has explored this conceptually to theorize and articulate the reasons for inaction (e.g., Adger et al. 2009; Naustdalslid 2011; Rühlemann and Jordan 2021), and practically (e.g., Corner et al. 2018; Richards and Den Hoed 2018; Schweizer et al. 2009) in order to develop best practice recommendations for climate change communication. In his 2015 essay, Hulme argues “it is necessary to reveal the underlying reasons for disagreement about how to act in response to climate change before it is possible to find constructive ways of acting politically in the world” (Hulme 2015; p. 894). Naustdalslid (2011) does this by conceptualizing climate change as a “modern environmental problem”; unlike “traditional environmental problems” such as sewage pollution or industrial smoke, modern environmental problems are not easy to perceive in time and space and are built into the structure and ways of modern society. Urban air pollution can be considered another modern environmental problem; air pollution has a well-understood negative impact on human health from gestation to death, and in urban areas, reducing emissions from road transport would bring immediate health benefits (e.g., Ferranti et al. 2019 and references therein), but inaction prevails. To articulate this paradox, Naustdalslid (2011) provides six paradigms (or reasons for disagreement; Hulme 2015), which are detailed in Table 2. These are the competition between traditional and modern environmental problems, the paradox of the irrelevance of tacit knowledge, specialization versus the need to integrate knowledge, the impossibility of scientific solutions to modern environmental problems, top-down versus bottom-up approaches, and the self-perception of scientists. These paradigms provide a useful framework for this study comparing governmental approaches to climate change communication, to examine whether current approaches reinforce or break down these paradigms, ultimately to evaluate current practice and provide recommendations.

In terms of academic research into best practices, there are numerous strategies and principles to effectively communicate climate change. For example, Richards and Den Hoed (2018) suggest focusing on “risk” rather than “uncertainty,” creating audience ownership of the problem and solutions, providing success stories, and making it local/personable. Schweizer et al. (2009) notes the importance of systems thinking, partnerships with other organizations and stakeholders, and involving senior leaders to inspire actions. Corner et al. (2018) sets out six techniques for effective communication: being a confident communicator, talking about the real world, connecting with what matters to the audience, telling a human story, focusing on the “knowns,” and using effective visual communication. Indeed, there is a growing use of visuals to convey climate change, such as photographs, maps, three-dimensional visualizations, infographics, graphs, cartoons, videos, documentary, and fictional films, covering a range of content like human and natural impacts, causes, and actions (Chapman et al. 2016; Cortese 2018; McLoughlin et al. 2018). Moser (2016) draws on existing work to approach this problem from the perceiver’s

TABLE 2. The six paradigms of translating scientific knowledge into action [summarized from [Naustdalslid \(2011\)](#)].

1) The competition between traditional and modern environmental problems	Governments have to prioritize their actions, and traditional environmental problems (e.g., sewage pollution), which are visible, better understood, and to which solutions have immediate effect, and therefore political gain, are often prioritized over the longer-term more invisible modern environmental problems such as air pollution or climate change; there are also conflicts between different environmental policies, e.g., nuclear power provides us with low-carbon power
2) The paradox of the irrelevance of tacit knowledge—the knowledge–action paradox	Scientific knowledge is supported by tacit (or experiential) understanding; people do not generally experience climate change, and many impacts (e.g., ice melt or African crop failure) are remote; thus, while scientists are familiar with the impacts and action required to mitigate/adapt to climate change, others outside the sector do not have the tacit knowledge required for action
3) Specialization vs the need for integrating knowledge	As science advances, it becomes increasingly specialized and therefore less accessible for the nonexpert; thus, fewer people can participate in informed debate, thereby making science more closed to nonexperts
4) The impossibility of scientific solutions to modern environmental problems	There is no single scientific solution to climate change, and, for the most part, it requires societal action to reduce emissions and adapt to different climate futures; thus, solutions lie between the interactions of nature and society
5) The top-down vs bottom-up paradox	Action for climate change requires the individual collective action of many to benefit those who are remote in terms of time (future inhabitants of the planet) and space (e.g., African farmers or “Small Island” nations); should this action be driven by top-down policies such as the Paris Agreement or by bottom-up alternatives like the School Strikes for Climate?
6) The self-perception of scientists (still locked up in the “traditional” paradigm?)	The increasing specialization of science (see above), along with the tacit understanding of climate change impacts and the need to mitigate and adapt by scientists (see above), places climate scientists in a unique position, increasingly distanced from nonexperts; scientists themselves must not fall into the trap of the “traditional” paradigm (i.e., they provide the knowledge for others to provide the solution) but instead must accept the complex interplay between knowledge, societal interests, and nature that ultimately influences decision-making

perspective, and defines five psychological defenses related to climate change, with guidance on when communication can trigger such responses, and help overcome them. These include (i) distance—defense against thinking, feeling, and knowing about climate change; (ii) doom—defense against thinking about the loss associated with climate change; (iii) dissonance—defense against the guilt of inaction; (iv) denial—defense linked to the loss of social standing and social dissonance of views on climate change; (v) identity—resistance to changing who we are to act on climate change (see [Mosser 2016](#), and references therein). Governments need to be aware of the potential psychological defenses that their communication materials can trigger, and alternative improved communication approaches.

3. Method

This study used a qualitative approach of three stages to analyze climate change communication by U.K. and Hong Kong governments. Stage 1 identified and sampled key documents; stage 2, coded selected documents as part of a textual analysis; and a visual analysis comprised stage 3. The method for each stage follows below.

Initially, those government departments responsible for climate change communication were identified ([Tables 3 and 4](#)). In Hong Kong, these are defined by their membership in the Steering Committee on Climate Change ([Table 4](#)). In the United Kingdom, there is no central governmental working

group for climate action, and thus relevant departments were selected based on their remit and responsibilities. Next, search engines and filter functions on government websites and social media pages were used to collect samples in their archives by entering key words (e.g., climate change, mitigation, adaptation). The search produced a range of communication materials (e.g., including formal reports, websites, campaigns, and social media), and the search was stopped once data saturation was reached, that is, continuing the search ceased to reveal new information. After this, the communication materials were purposefully selected by availability, timeliness, relatedness, and representativeness ([Flick 2014](#)) and were categorized into five categories using the criteria shown in [Table 5](#). These categories, developed from reflecting on the sampled material, are exhaustive, sensitizing, mutually exclusive, and conceptually congruent and were developed in line with the research questions ([Merriam and Tisdell 2015](#)). The study sought to balance the number of samples between the two regions for analyses. Note that category 5, official statements and press releases, are not included within this preliminary study due to time constraints. Future work will seek to code these data to examine these communication approaches. Sampling of news and social media took place between 1 January 2018 and 31 July 2019; Cantonese content was translated by author Wong. By its design, the sampling and categorization process can introduce bias, and these are acknowledged and discussed in [section 5c](#).

The second stage examined three key policy documents for each government using a contents analysis, that is, a systematic



TABLE 3. U.K. key government departments in responding to climate change (correct as of 2019 when the research was undertaken).

Key government departments	Key responsibilities on climate change
Department for the Environment, Food and Rural Affairs (Defra)	Develops and implements national adaptation programs
Department for Business, Energy and Industrial Strategy (BEIS)	Promotes energy efficiency, renewable energy, green economy, and industry
Met Office <sup>a</sup>	Monitors climate change in the country and provides climate data and information
Environment Agency (EA) <sup>b</sup>	Administers the Climate Change Agreements scheme and conducts environmental assessment
Ministry of Housing, Communities and Local Government (MHCLG)	Coordinates sustainable development within local authorities
HM Revenue and Customs	Looks after climate change levy
HM Treasury	Develops green finance strategy
Foreign and Commonwealth Office (FCO)	Participate in international climate conference and arrange overseas funding
Department for International Development (DFID)	
Department for Education (DfE)	Educates young people about climate change
Department of Health and Social Care (DHSC)	Monitor health impacts and respond to heat-wave effects
Public Health England (PHE)	
Department for Transport (DfT)	Supports zero emission road transport and develops transport energy model

<sup>a</sup> The Met Office is an executive agency sponsored by BEIS.

<sup>b</sup> The Environment Agency is an executive nondepartmental public body sponsored by Defra.

and robust examination of textual material for themes in order to interpret subjective meaning or social construction of issues, events, or practices (Flick 2014). The three documents were chosen for coding based on their strategic importance, and their relevance to the governmental climate change agenda. For the United Kingdom, these included the Climate Change Act and two reporting documents mandated by the Climate Change Act that form the basis of policy making, namely, the U.K. Climate Change Risk Assessment (CCRA), which feeds into the National Adaptation Programme (NAP; primarily England, but some United Kingdom-wide matters; adaptation policy is a devolved matter). For Hong Kong, documents of equivalent importance include the Hong Kong Climate Change Report, Hong Kong Action Plan 2030+, and the Long-Term Decarbonisation Strategy. The latter was selected for its broader remit in comparison to other mitigation-focused documents that tended to focus on a specific sector (e.g., built environment). The text was coded to capture the relevant characteristics, and enable a quantifiable comparison of different documents, themes, and messages (Merriam and Tisdell 2015). The study used inductive codes decided prior to analysis from literature review and discussions, and were orientated to answer the research questions, and deductive codes, which are key themes and messages that emerged during the coding process (Braun and Clarke 2006). Examples of inductive codes include “climate change,” “public,” “awareness” and “communication,” and of deductive codes include “community,” “opportunity,” and “science.” Words with similar meanings or implications were grouped as one code (Tables 6 and 7). These were then counted and analyzed to illustrate how the governments communicate climate change to the public and which messages are contained in each method. For instance, the more frequent occurrence of the words “impact” or “risk” implied more focus on risk communication, whereas more instances

of “health” entailed more attention on how climate change relates to people personally.

Third, the visual content of material from policy documents and social media was considered. Visual approaches communicate differently than verbal and create feelings and texture, speaking directly to viewer’s inner self, evoking memories and reflections (Spencer 2011). They can be effective mechanisms to provoke emotions, motivate behavioral and value changes (Green 2018), and engage people more effectively than texts because they draw attention through vivid portrayals and help viewers remember information and transcend linguistic and geographical obstacles (O’Neill and Smith 2014). Here, visual

TABLE 4. Members of the Hong Kong Steering Committee on Climate Change (correct as of 2019 when the research was undertaken).

No.	Hong Kong SCCC
1	Chief Secretary for Administration’s Office
2	Environment Bureau (ENB)
3	Civil Service Bureau
4	Commerce and Economic Development Bureau
5	Constitutional and Mainland Affairs Bureau
6	Development Bureau
7	Education Bureau (EDB)
8	Financial Services and the Treasury Bureau
9	Food and Health Bureau
10	Home Affairs Bureau
11	Innovation and Technology Bureau
12	Labor and Welfare Bureau
13	Security Bureau
14	Transport and Housing Bureau
15	Information Services Department (ISD)
16	Financial Secretary’s Office Economic Analysis and Business Facilitation Unit
17	Hong Kong Observatory (HKO)

TABLE 5. Category descriptors used to organize the qualitative data collection.

No.	Codes	Any reference to the following descriptions
1	Policy and reporting	Policy papers, including legislation and action programs
2	Education	Education, related to school curriculum
3	Campaigns	Campaigns promoting climate actions, and related environmental campaigns
4	Internet, mass media, and social media platforms	Internet, including official websites; mass media, including TV advertisements and billboards; official social media sites administered by the government departments
5	Official statements and press releases	Official statements and press releases, including news stories and speeches, published by the government

content was analyzed following a procedure outlined by [Flick \(2014\)](#): first, observe the content; second, analyze its formal composition; third, ask for the intentions behind production; and finally, analyze its reception and social use from the audience perspective. Visual analysis was applied to the categories of policy, campaigns, and media platforms because they are communicated with obvious visual materials. Visuals were collected using screen capture function of Microsoft's Snipping Tool, and leading (e.g., front cover/main campaign image) images were prioritized. For example, cover and content pages with visual elements were captured from policy papers; relevant department and campaign web pages were captured as samples; social media sites were chosen according to the location popularity such as Twitter in the United Kingdom and Facebook in Hong Kong, and then posts were selected depending on the timeliness and relatedness.

To ensure rigor in the collection, sampling, and coding of the qualitative data, the researchers used several strategies proposed by [Noble and Smith \(2015\)](#) to ensure validity (i.e., the degree to which the findings represent the data) and reliability (i.e., consistency in approach and bias reduction). This included regular debriefing during the sampling between researchers to ensure the approach was collecting the data required to address research aims and being aware of sampling biases during data collection ([section 5c](#)). The majority of data

came from official government sources, while the rest were supporting data from verified or authoritative sources, and all were taken in legal and ethical means. Coding was undertaken systematically by one researcher but cross-checked with other members of the team. Where new codes evolved (e.g., community, opportunity), these were retrospectively applied to previously coded work, and emerging findings were discussed as a team to reach a consensus. For the visual analysis, the team discussed the sampled materials to reflect on whether they were representative of the broader materials available for sampling and how they fit the research aims, and to discuss the results of the visual analysis to understand how individual beliefs and judgments could introduce phenomenological bias.

#### 4. Comparing climate change communication in United Kingdom and Hong Kong

##### a. Policy and reporting

In the United Kingdom, the 2008 Climate Act mandates emissions reductions by 100% (originally 80%) by 2050 as compared to the 1990 baseline, with 5-yearly carbon budgets, and 5-yr cycles of adaptation programs and risk assessment. The independent Committee on Climate Change (CCC) advises the government on targets and progress, and the Adaptation Subcommittee undertakes risk assessments, and

TABLE 6. Codes in the three U.K. policy papers.

No.	Codes	Climate Change Act 2008 (108 pp.)	Climate Change Risk Assessment 2017 (24 pp.)	National Adaptation Programme 2018 (128 pp.)
1	Climate change	235	420	307
2	Impact/risk	33 (impact)/3 (risk)	27 (impact)/685 (risk)	128 (impact)/512 (risk)
3	Public/people/community	19 (public)/6 (community)	18 (public)/11 (people)/14 (community)	65 (public)/24 (people)/70 (community)
4	Aware/understand	0	1 (aware)/7 (understand)	16 (aware)/53 (understand)
5	Communication	0	0	33
6	Behavior	0	1	6
7	Action	14	48	222
8	Responsibility/responsible	2 (responsibility)/8 (responsible)	2 (responsibility)	16 (responsibility)/7 (responsible)
9	Health	0	21	133
10	Media	0	0	1
11	Publication/publish	8 (publication)/57 (publish)	8 (publication)/19 (publish)	36 (publication)/63 (publish)
12	Opportunity	2	33	59
13	Science/scientific/scientist	2 (science)/5 (scientific)	1 (science)/1 (scientific)/1 (scientist)	10 (science)/6 (scientific)/2 (scientist)

TABLE 7. Codes in the three Hong Kong policy papers.

No.	Codes	Hong Kong Climate Change Report 2015 (122 pp.)	Hong Kong Climate Action Plan 2030+ (102 pp.)	Long-Term Decarbonisation Strategy (56 pp.)
1	Climate change	490	91	79
2	Impact/risk	372 (impact)/75 (risk)	18 (impact)/29 (risk)	24 (impact)/7 (risk)
3	Public/people/community	110 (public)/51 (people)/228 (community)	125 (public)/25 (people)/30 (community)	73 (public)/3 (people)/13 (community)
4	Aware/understand	15 (aware)/15 (understand)	16 (aware)/4 (understand)	15 (aware)/1 (understand)
5	Communication	18	2	3
6	Behavior	7	6	15
7	Action	47	42	41
8	Responsibility/responsible	14 (responsibility)/7 (responsible)	1 (responsibility)/2 (responsible)	2 (responsibility)/3 (responsible)
9	Health	41	17	8
10	Media	2	0	3
11	Publication/publish	4 (publication)/8 (publish)	1 (publication)/8 (publish)	3 (publication)/7 (publish)
12	Opportunity	31	16	10
13	Science/scientific/scientist	27 (science)/3 (scientific)/2 (scientist)	8 (science)	3 (science)/3 (scientific)/3 (scientist)

monitors climate change impacts, opportunities, and adaptation progress. Policy and reporting are led by the Departments for Environment, Food and Rural Affairs (Defra), and Business, Energy and Industrial Strategy (BEIS); Table 8 shows all recent reports that mention climate change. The governments of the devolved administrations of Scotland, Wales, and Northern Ireland are legally bound by the Climate Change Act but have separate climate change policies and reports; these are not included in this study.

In Hong Kong, ENB is responsible for developing policy and reporting on climate change. They established the Steering Committee on Climate Change (SCCC) that reports directly to the Hong Kong Chief Executive and includes representatives from the 13 policy bureaux (e.g., Food and Health Affairs; Transport and Housing, and 11 more) and three departments (Table 4). The SCCC coordinates climate actions, formulates strategies to meet the carbon reduction target, enhances public awareness and understanding, and promotes collaboration with private sectors. Within the ENB, the Council for Sustainable Development (SDC) advises on decarbonization strategies and facilitates community participation whereas the Environmental Protection Department (EPD) develops and enforces policies. The 2017 Climate Action Plan 2030+ outlines how Hong Kong can reduce its carbon intensity by 65%–70% using 2005 as the baseline by 2030 (ENB 2017). There is no target post-2030, and targets are not mandated.

The textual content and characteristics of the three most relevant climate change documents were analyzed for each country/region (Tables 6 and 7). Analysis of the U.K.'s Climate Change Act revealed the government viewed publishing reports and creating programs and plans to be fundamental. The impacts and risks of climate change were clearly and frequently stated, but with less discussion of the opportunities, and the responsibilities are mostly delegated to different government departments or local authorities. The Act lays the responsibility for communicating with the CCC and does not consider the role of governmental departments in communication. The

2017 Climate Change Risk Assessment (Defra 2017) is a scientific report that communicates and scores the impacts and opportunities of climate change to people, public health and wellbeing, ecosystems, businesses, buildings, and water supply. It is factual and nonemotive in content, and communication of the content is taken as given, with no explicit consideration given to communication of the material. The National Adaptation Plan (Defra 2018) is the only document that explicitly considers communication with a subchapter on “raising awareness and promoting action.” There are several statements noting the importance of community action to strengthen resilience, for example, “An important aspect of adaptation is communication and we will work to ensure that across society people understand the challenges and risks which may lie ahead. Government will look to improve communication channels and work with professional bodies . . . to engage ever more people to take action” (Defra 2018, p. i).

The Hong Kong Climate Change Report 2015, Hong Kong Climate Action Plan 2030+, and Long-Term Decarbonisation Strategy, all introduce the concept of climate change and its relationship with Hong Kong. The Climate Change Report outlines the climate actions of the government and stakeholders in private sectors and highlights the importance of public awareness of climate change, with raising public awareness and understanding as one of their targets and responsibilities. “The more we are aware of climate risks, the better our people can contribute to mitigation and adaptation, which would increase the city’s overall ability to deal with climate change” (ENB 2015, p. 10).

The Climate Action Plan 2030+ proposes a new target and detailed plans responding to the Paris Agreement whereas the Long-Term Decarbonisation Strategy, is a public engagement to formulate the city’s future decarbonization plan. Neither document explicitly considers communication to the public. In comparison to the United Kingdom, all three documents use more emotive words to describe the risks of climate change and extreme weather events, such as “onslaught,” “strike,” “danger,” “multiplier,” “defend,” “vulnerabilities,” “unmistakable,” and



TABLE 8. Classification of climate change communication in United Kingdom and Hong Kong. The most popular social media sites are shown in *italics*.

United Kingdom	Hong Kong
Policy and reporting	
1) Climate Change Act (2008)	1) Hong Kong Climate Change Report ( <a href="#">ENB 2015</a> )
2) National Adaptation Programme ( <a href="#">Defra 2018</a> )	2) Hong Kong Climate Action Plan 2030+ ( <a href="#">ENB 2017</a> )
3) U.K. Climate Change Risk Assessment ( <a href="#">Defra 2017</a> )	3) Long-Term Decarbonisation Strategy ( <a href="#">SDC 2019</a> )
Clean Growth Strategy: Proposals to decarbonize all economic sectors in the United Kingdom through the 2020s (produced by BEIS in 2017)	Energy Saving Plan for Hong Kong's Built Environment 2015–2025+: Blueprint to increase energy efficiency (produced by ENB, Development Bureau, and Transport and Housing Bureau in 2015)
Industrial Strategy: Benefits to industry by providing low-carbon technologies, systems, and services (produced by BEIS in 2017)	Hong Kong Blueprint for Sustainable Use of Resources 2013–2022: Strategy, targets, policies, and action plans for waste management; emphasis on mobilizing people and making sustainable culture part of daily life (produced by ENB in 2013)
Road to Zero Strategy: Transition to zero emissions from road transport (produced by DfT in 2018)	Deepening Energy Saving in Existing Buildings: Outlines the 4 Ts for energy efficiency (targets, together, transparency, and timeline) (by <a href="#">ENB 2017</a> )
25 Year Environment Plan and Progress Report: Goals and progress to improve the environment for 25 years from 2018 (produced by Defra in 2018 and 2019)	
Education	
England and Wales: Climate change is part of compulsory topics within science (age 11–16) and geography (age 11–14)	Climate change is a specific topic that is compulsory within
Scotland: Climate change is part of learning for sustainability theme (age 3–15)	General studies (age 6–11)
Northern Ireland: Climate change is part of geography in key stage 3 (age 11–14)	Science (age 9–14)
	Liberal studies (age 15–17)
Campaigns	
Green Great Britain and Northern Ireland (since 2018; developed by BEIS)	ClimateReady@HK (since 2016) campaign has promotional videos via social media and TV advertising, and public tools: Carbon Footprint Repository and Low Carbon Living Calculator
Smart Energy GB–TV and outdoor advertising to promote smart energy-meter use and energy efficiency.	Associated campaigns on saving energy and water, and reducing waste
Internet and social media	
Internet: GOV.UK website, Met Office, Smart Energy GB, and Green GB&NI Week	Internet: GOV.HK, HKO, and ClimateReady@HK
Social media (Facebook)	Social media (Facebook)
@DefraGovUK 14 883 fans; 16 344 followers	@bigwaster.hk 65 240 fans; 66 619 followers
@metoffice 319 240 fans; 329 694 followers	@hk.observatory 152 194 fans; 165 447 followers
Social media (Twitter)	Social media (Twitter)
@DefraGovUK 146 000 followers; 2863 likes	HKO @ObservatoryHK 14 700 followers
@beisgovuk 180 000 followers; 2350 likes	Social media (Instagram)
@metoffice 767 000 followers; 15 000 likes	@big_waster_hk 8866 followers
@MetOffice_Sci 4930 followers; 795 likes	@hk.observatory 19 500 followers
Social media (Instagram)	@ecc1990 1423 followers
@defrauk 7130 followers	Social media (YouTube)
@metoffice 82 100 followers	ClimateReady@HK 175 subscribers
Social media (YouTube)	ENB, HKSARG 65 subscribers
Defra 1182 subscribers	HKO hkweather 53 700 subscribers
BEIS 237 subscribers	
Met Office 64 860 subscribers	
Met Office Science and Services 137 subscribers	

“battle.” They also note that HKs largest source of carbon emissions comes from electricity generation, and the high carbon footprint per capita (Table 1), implying the responsibilities of the city and individuals to mitigate climate change. Personal responsibility is also a theme in other documents such as Energy Saving Plan for Hong Kong’s Built Environment, and Deepening Energy Saving in Existing Buildings (Table 8).

### b. Education

Education in the United Kingdom is devolved, with separate systems for separate regions, administered by the U.K. governments (England), Welsh and Scottish governments, and Northern Ireland Executive. In England, as part of the national curriculum, climate change is part of broader compulsory topics within science (chemistry of Earth and atmosphere) at key stages 3 (age 11–14) and 4 (ages 14–16), and in geography at key stage 3 geography as “part of changes in climate from the Ice Age to the present” and understanding how “human and physical processes interact to influence, and change landscapes, environments and the climate” (Department for Education 2014). In Scotland, climate change is part of several curriculum areas including science, technology, social studies, health and well-being, and religious and moral education, as part of the “sustainability” theme (Education Scotland 2019). In Wales, education follows the national curriculum for children ages 7 to 16. In Northern Ireland, climate change is only part of statutory requirements for geography at key stage 3, as part of consideration of local and global conflict between social, economic, and environmental needs. To support climate change education, the Met Office (an executive agency of government sponsored by BEIS) produces noncompulsory educational resources for schools related to climate change, including a lesson plan on climate impacts for ages 7–11 and 11–14.

Education in Hong Kong is overseen by the Education Bureau, part of the SCCC (Table 4). Climate change is compulsory within primary and secondary education, within general studies, science, and liberal studies. Specifically, children aged 5–8 should understand “climate and weather changes in Hong Kong and how they affect everyday life” (general studies); children aged 8–11 should understand the “effects of natural changes of the environment (e.g., climate change, natural hazards) on people and how people respond to these changes,” be aware that “global issues that are the common concerns of mankind (e.g., climate change)” (general studies), and “show concern for the environment and climate changes” (science) [Education Bureau (EDB) 2017a]. Older children aged 11–14 should “recognize the effects of human activities on the environment, climate” and “act responsibly in conserving the environment for sustainable development” (science); ages 11–16 should “understand climate change, basic environmental protection, as well as the interdependence of living things and their environment” (liberal studies) (EDB 2017b). The HKO (a government department) has educational material linked to their climate change website and undertakes climate change talks at schools.

### c. Campaigns

At national level within the United Kingdom, there were three separate campaigns during the study period that are

relevant to the governmental climate change agenda. Regional campaigns by local authorities are not included in this study. Campaigns by the U.K. government include Green Great Britain and Northern Ireland (Green GB&NI; since 2018). This is a week of events and activities, where the government, businesses, academia, and civil society come together to explore clean growth, climate science, and current and potential actions on climate change as well as opportunities and challenges. In 2019, Defra launched the Year of Green Action (YoGA) environmental campaign to coincide with 25 Year Environment Plan; this does not explicitly consider climate change nor link with Green Great Britain week. In 2019, BEIS collaborated with Smart Energy GB to use television (TV) and billboard advertising to promote energy efficiency and the use of smart meters (Fig. 1c), but there are no specific advertising campaigns on other aspects of climate change, such as future risks, or personal action to mitigate and adapt.

Since 2016, the ENB have used ClimateReady@HK, the governmental campaign to raise public awareness and understanding on climate change by providing a range of resources and information, and public tools such as the Carbon Footprint Repository and Low Carbon Living Calculator. The campaign web page includes climate change–related news, an agenda of events, workshops and seminars organized by different government departments, and uses a cartoon mascot called “Big Waster,” or Hanson (meaning saving master) (Fig. 1). Videos from the ClimateReady@HK are broadcasted as 30-s TV advertisements with themes ranging from energy saving, green and low-carbon living, and food waste reduction. *The Climator* is one promotional film introducing the concept of climate change, inviting the Hong Kong public to be the “guardians of mother Earth” and take decarbonized actions, while pointing out their contribution to greenhouse gas emissions (Fig. 1d).

### d. Internet and social media platforms

Both U.K. and Hong Kong governments have websites (GOV.UK; GOV.HK) that host all official documents related to climate change. Neither have a climate change tab on their homepage; the search function is required to local documents related to climate change. The search function in GOV.UK enables filtering by date, topic, and media type, and there were 16 974 between January 2018 to July 2019, related to “climate change” including news and communications (49%), guidance and regulation (20%), research and statistics (7%), policy papers and consultations (4%), services (1%), Freedom of Information releases (1%), and others (17%). On GOV.HK, there were more than 1000 results under “climate change” between January 2018 and July 2019, including relevant news, reports, and websites. Unlike the United Kingdom, GOV.HK has a dedicated home page for climate change, which overviews the topic, and provides hyperlinks for more information.

Both the Met Office and HKO host their own websites that contain comprehensive written and visual material on climate change. The Met Office provide information for lay audiences, such as factual videos and infographics, and technical reports summarizing recent scientific research under the key sub-headings: *What is climate change?*; *Causes of climate change*; *Effects of climate change*; *U.K. climate*; *Climate science*;

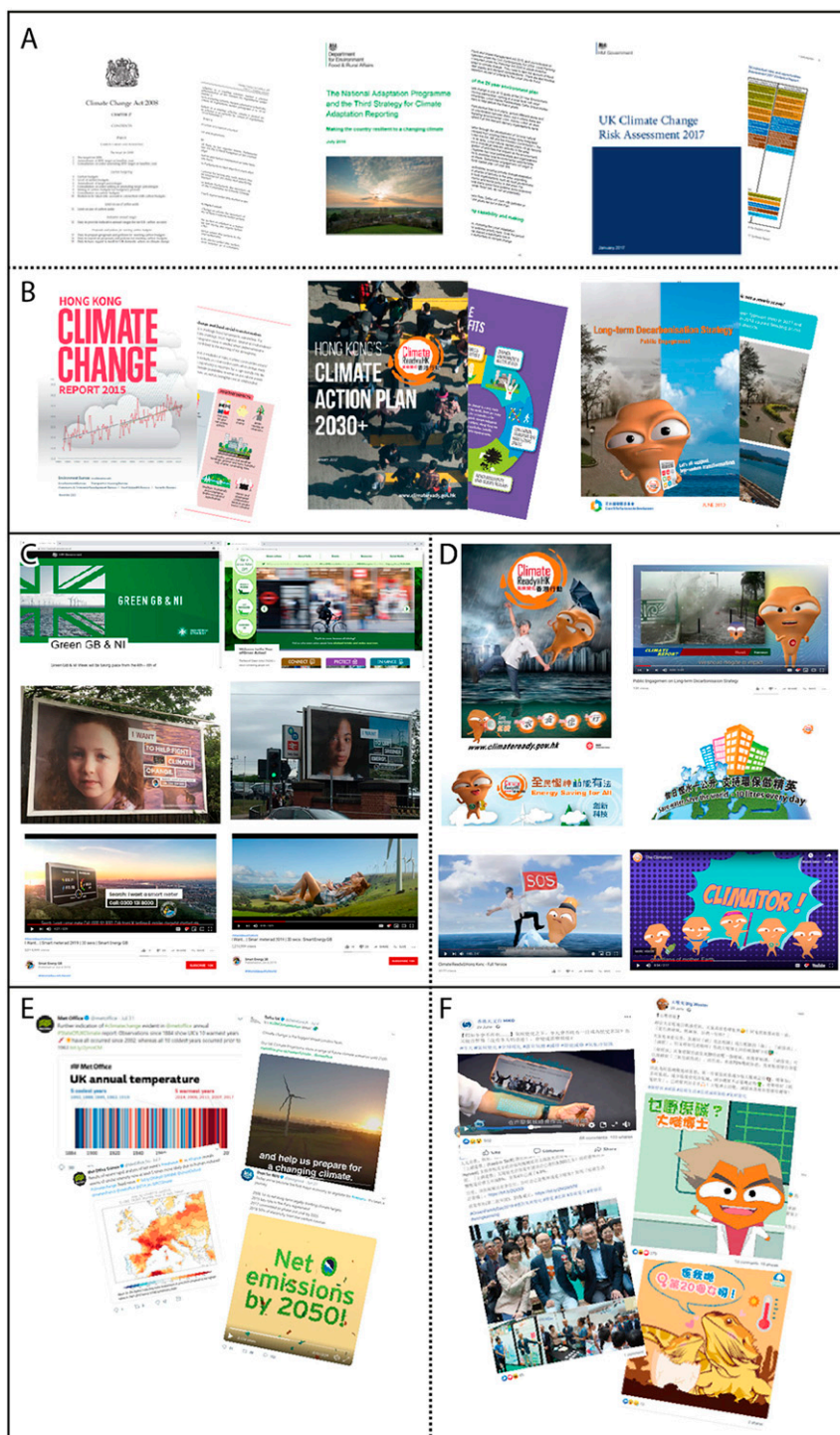


FIG. 1. Visual comparison of climate change communication. (a) The front cover and a typical page from the three U.K. policy documents selected for contents analysis. (b) The front cover and a typical page from the three Hong Kong policy documents selected for contents analysis. (c) (clockwise from top left) The Green GB&NI campaign homepage, the YoGA campaign homepage, billboard featuring Smart Energy campaign, YouTube video from Smart Energy campaign, YouTube video from Smart Energy campaign, and billboard featuring Smart Energy campaign. (d) (clockwise from top left) Campaign poster from ClimateReady@HK, promotional film to accompany the decarbonization strategy, ClimateReady@HK “Let’s save

*Organizations and reports.* The Met Office also hosts the U.K. Climate Projections (UKCP) program that supports climate change risk assessments and adaptation, and enables users to download data, associated scientific reports and infographics. The Met Office does not provide information on how individuals or organizations can mitigate greenhouse gas emissions or adapt to climate change. The HKO also uses videos, infographics, and reports to communicate climate change information, subdivided into similar headings: *Global climate change; Climate change in Hong Kong; Causes of climate change; Climate projection; Education resources; Vital indicators of climate change.* There is less material available from HKO, particularly with regard to research, as expected given their comparative size and resources; Met Office has ~2000 employees, whereas HKO has ~350 employees.

With regard to social media, in the United Kingdom, the Met Office accounts available via Facebook, Instagram, and YouTube have the greatest followings and most frequent updates, about 20 Twitter posts per day, whereas the other accounts have lower or irregular post frequency (Table 2). That said, the majority of Met Office messaging contains meteorological content such as weather forecasts; Defra and BEIS social media sites only convey climate change messages occasionally besides their main working areas. In Hong Kong, HKO has the greatest following on social media, but like the Met Office, posts are not solely about climate change. Big Waster used as a mascot by ClimateReady@HK also has a substantive following, and the campaign also has a YouTube channel with 35 promotional videos and clips. For example, *The Climator* is one promotional film introducing the concept of climate change, inviting the Hong Kong public to be the “guardians of mother Earth” and take decarbonized actions. It gives a clear message of responsibly acting on climate change.

#### e. Visual analysis (policy, campaigns, and media platforms)

Figure 1 compares the visual differences between the policy documents, campaigns and social media posts used by the U.K. and Hong Kong governments. The U.K. documents (Fig. 1a) are plain in design, with some information summarized in tables in the CCRA and NAP, showing the government’s motivation to deliver the policies in a serious and important manner, but in a way that may not attract the public attention (after Flick 2014). The CCRA was released with infographics and animations but these were produced by the nongovernmental CCC. In contrast, the 2019 TV and billboard advertising by Smart Energy GB and BEIS featured children who “want a beautiful world” in the narratives and imagery (Fig. 1c) to form a connection and emotive response in audiences. Figure 1c shows the U.K. homepages for the Green

GB&NI and YoGA campaigns. These campaigns used a color scheme of green and short and simple language to attract the audience and disseminate the message of acting on climate change.

The documents produced by the Hong Kong government are more colorful with infographics and pictures, and written in simple language, showing the government’s motivation to deliver the policies and climate change message in an attractive and vivid way that the public can understand (Fig. 1b). The Action Plan and Strategy also have supplementary graphical pamphlets that summarize key information. Visually, the Hong Kong campaigns (Fig. 1d) use various colors, short slogans, local images, or funny characters to attract and encourage the audience to take climate actions and protect the environment. *The Climator* film features a heroic storyline, background music, narratives, and colorful animation that can arouse the interest of the public regardless of age and education background. Other promotional films also convey a similar message but show real shots of local extreme weather and feature a local celebrity singing a Cantonese rap song.

Both U.K. and Hong Kong government social media posts use infographics and short animations (Figs. 1e,f), albeit with different styles. As with the policy documents, the U.K. social media posts are factual, communicating climate change in an informative, scientific, and neutral manner. Hong Kong posts are less formal, with cartoon animations and more personable images, albeit combined with educational content and the message of social responsibility.

## 5. Discussion

### a. Comparing the methods and messages of climate change communication in United Kingdom and Hong Kong

This work has highlighted important similarities and differences in climate change communication between the U.K. and Hong Kong governments. First, both governments communicate climate change information using similar modes as outlined in section 4 and Table 8, and communication via social media is led by the meteorological agencies. In Hong Kong, climate change communication coalesces around the ClimateChange@HK campaign using the mascot Big Waster across multiple communication platforms (official documents, social media, TV advertising, billboard); there is no equivalent broad-reaching campaign specific to climate change within the United Kingdom. There is also a notable difference in approaches to education; in Hong Kong, climate change is embedded in the compulsory curriculum from an earlier age and from a scientific and societal context. The United Kingdom has

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10 L water campaign,” *The Climator* promotional film, ClimateReady@HK featuring a celebrity rap song, and ClimateReady@HK “Energy Saving for All” campaign banner. (e) Selected social media posts from U.K. government accounts captured during the sampling period. (f) Selected social media posts from U.K. government accounts captured during the sampling period. Note the repeated occurrence of the Hong Kong mascot Big Waster in features on Hong Kong decarbonization strategy, campaign materials, and a social media post.



specific legislation on climate change and more ambitious targets than Hong Kong.

With regard to messaging, both governments focus on actions via strategies and action plans and consider the opportunities of a changing climate. This solution-oriented message is very important, enabling the audience to envision a positive and desirable future, and promoting engagement (Markowitz and Guckian 2018). As compared to the United Kingdom, Hong Kong has a greater focus on personal responsibility and behavioral change in all categories of communication. Giving a sense of personal responsibility can connect with the audience to create ownership of the problem and solutions, incite emotions, and urge behavioral change (Bulkeley and Newell 2010; Richards and Den Hoed 2018). Providing positive actions for the public to undertake can be empowering and instructs people to reach the goal (Moser and Dilling 2007; Schweizer et al. 2009).

Visually, Hong Kong policy papers are more colorful with infographics and local pictures, using simple language, with stories of recent typhoon and flooding damage linking to future climate change; this approach can be more effective and appealing to the wider public who have limited knowledge and interest (Green 2018). Moreover, by localizing the climate change agenda to the Hong Kong audience, the content becomes meaningful to the audience (Schweizer et al. 2009) and using stories is more likely to provoke emotions and encourage proenvironmental behavior in comparison to information narratives (Morris et al. 2019). The visual content of the Met Office website was not considered in this study; however, this contains a range of visual resources to communicate the science of climate change.

This comparison highlights several elements of good practice. The ClimateChange@HK campaign demonstrates a systems approach to climate communication that draws together multiple communications modes (social media, TV, workshops, seminars) and messages to create meaningful material specific to Hong Kong, that connects to local cultural values and beliefs, and gives Hong Kong residents specific actions to mitigate their climate impact (e.g., low-carbon living). This embodies many aspects of good climate communication (e.g., Corner et al. 2018; Schweizer et al. 2009), and the use of emotive language, people, place, and personal behavior helps to reduce the psychological distance to climate change (Moser 2016). Indeed, themes of people, place, and personal behavior are prevalent within Hong Kong's 2015 Climate Change Report, and personal responsibility and the role of humans in anthropogenic climate change are at the core of the compulsory climate change education.

The approach of the Hong Kong government helps to address several of the paradigms of climate change inaction raised by Naustdalslid (2011; Table 2). Namely, by using stories and localizing the impacts of and actions for climate change, in policy, campaigns, and social media, the communication material gives the audience a tacit understanding of the problem (paradigm 2) and raises awareness of individual action to mitigate climate change (paradigm 4). Hong Kong's national curriculum also addresses these paradigms, and by focusing climate change education on the nexus of nature and society (in

liberal arts topics as well as science), it is providing future generations with the scientific knowledge and societal responsibility to respond to climate change (paradigms 2, 3, and 4). However, in Hong Kong there is potential for improvement by mandating climate action, setting ambitious targets, and thereby making climate change of equivalent importance to those traditional environmental problems for which legislation currently exists. Although the Hong Kong Climate Action Plan 2030+ and Long-Term Decarbonisation Strategy outline the actions that need to be taken by public and private stakeholders, there is less emphasis on personal responsibility in these policies suggesting an implementation gap. Strengthening this top-down approach would complement the current fundamentally bottom-up approach to climate communication (paradigm 5).

In contrast, the United Kingdom has a strong top-down approach that mandates emissions reductions and climate adaptation via the 2008 Climate Change Act. These policies and the social media communication materials produced by the Met Office overtly address Moser's (2016) psychological defense of dissonance in the understanding and knowledge of climate change, by emphasizing the evidence and scientific consensus and outlining a course of viable action to build resilience and reduce emissions using factual and nonemotive language. There is clear advice for infrastructure and built environment practitioners, but without the element of personal responsibility. The BEIS Smart Energy GB campaign for energy efficiency stands alone in its connection to people, emotive visual messaging (Fig. 1c) and desire to initiate individual action. Overall, despite strong rhetoric and mandatory action, the U.K. approach is potentially reinforcing several of the paradigms of climate inaction by failing to consider the science–society nexus. Without using stories, emotive language, or materials that make climate change real and understandable for a general audience, the United Kingdom does not provide the tacit understanding of the topic needed for general action (paradigm 2). This is reinforced by the minimal and purely scientific consideration of climate change in the national curriculum for England, Wales, and Northern Ireland, which does not provide the future generations with a broad understanding of the science of climate change, thereby increasing its status as a specialized subject for experts (paradigm 3). Nor does the national curriculum provide an understanding of the role individuals can have mitigating or adapting to climate change (paradigm 4). Last, there is a sense that without consideration of the science–society nexus, combined with the nonpersonalized communication materials, and the delegation of many of the climate change actions to other bodies and local authorities, that the U.K. government remains locked in the traditional paradigm, providing knowledge for others to provide the solution (paradigm 6). On a practical level, this inhibits a systems approach to communication, as exemplified by the parallel campaigns of Green GB&NI, YoGA and energy efficiency that do not interlink, or connect to social media material produced by the Met Office or the education curriculum.

To conclude by drawing on Naustdalslid (2011), the United Kingdom approaches climate change communication more from the perspective of a “traditional environmental problem”



to which there are top-down scientific (e.g., Met Office) and engineering solutions (e.g., CCRA/NAP), and legislation, but the bottom-up role of individual action is less considered. Accordingly, the focus of U.K. communication materials lies in policy, reporting, and the factual communication of science via the Met Office, a world-leading research institution on climate change. In contrast, Hong Kong approaches communication with a greater consideration of the science–society nexus and the role of personal responsibility, but without any top-down legal responsibility to undertake actions or meet targets. Their communication approach emphasizes the importance of education, and tailoring the content of communication materials (e.g., reports, campaigns, social media) to connect the public to the problem. Last, in the broadest sense, this comparative study illustrates both sides of Naustdalslid fourth paradox; should this action on climate change be driven by top-down policies such as the Paris Agreement or bottom-up alternatives like the School Strikes for Climate?

#### *b. Recommendations for U.K. and Hong Kong governments*

Building on the analysis within paradigms of climate inaction, this study has several recommendations. First, the U.K. government should embed climate change across the national curriculums from preschool onward in a greater range of learning contexts. This would reduce the specialization of the topic (paradigm 3) and define climate change as a science–society problem to which collective individual action is required (paradigm 4). Contextualizing the education materials, for example, in terms of extreme weather events, can provide the tacit knowledge of the problem (paradigm 2). Early education can fundamentally influence behavior and shape lifestyles, and effective environmental education creates ecological identity and responsibility (Bateson 2007; Moser 2010). Education has a vital role in raising awareness of climate change and transitioning to low-carbon, sustainable lifestyles and should feature in societal curricula, in addition to geography and science, from early years (paradigm 4). Second, the U.K. government should incorporate behavior and personal responsibility within communication messages (paradigms 4 and 6). To achieve net-zero targets and adapt to future climate change will require actions from individuals. This is touched on in the BEIS Smart Meter campaign (i.e., emissions reductions by energy efficiency), but the role of individuals and the action they can take is not clearly communicated by the U.K. government in policy, or via social media, which often focuses on the neutral communication of the science.

In Hong Kong, the government should create targets that are more ambitious, enhance departmental involvement, and prioritize climate change in policy making. This will prioritize climate action, giving it equivalent status to other environmental problems for which legislation exists (paradigm 1). Although Hong Kong has targets for reducing carbon intensity and a climate action plan, these are regulatory frameworks and are not legally enforced. Previous studies have criticized the government for weak targets, prioritizing the economy first, and doing “too little, too late” (Ng 2012; Mayer 2017). Besides the ENB, departments should be more proactive and involved

in communicating climate change (paradigm 6). An effective communication needs credible messengers and interdisciplinary collaboration (Korte 2016; Schweizer et al. 2009).

In general, both U.K. and Hong Kong governments should increase dialogic conversation and usage of other modes of communication. Although two-way communication is possible via education, and in part by social media, there is scope to increase dialogic communication of climate change, perhaps via other modes such as museums or interactive plays (e.g., *Where's My Igloo Gone?*; Ledger 2018). Dialogic communication allows communities to frame their own problems and solutions thereby exploring their tacit understanding of climate change (paradigm 2; e.g., Nursey-Bray et al. 2019; Rudiak-Gould 2012) and options for climate action (paradigm 4; e.g., Nursey-Bray et al. 2012). Dialogue can also overcome the psychological defenses to climate inaction by focusing on aspects such as community well-being (reducing defense—distance), the immediate community benefits for adaptation (reducing defense—doom) and creating shared visions of better future (reducing defense denial and identity) (Moser 2016). Both governments also need more engagement and longer-term dialogues with the climate protesters. Dialogic or interactive communication are more likely to increase involvement, understanding, and social unity than one-way written or verbal communications (Moser 2010; Corner et al. 2018) and could motivate the individual actions required to reduce emissions and adapt to climate change.

Last, both governments must evaluate the effectiveness of communication methods. As leaders of civil society, a government has the prime responsibility for raising awareness of climate change and motivating action (Bingham 2007) and thereby responding to what is commonly called the “climate emergency.” Accordingly, government should evaluate their own communication approaches to understand if their communication raises awareness and encourages positive climate action and adjust methodology accordingly (paradigm 6).

#### *c. Limitations*

This study overviews the methods by which the two governments communicate climate change (Table 8) and considers the different messaging via a contents analysis of key policy documents and visual analysis of policy documents/reports and social media content (Fig. 1). This is a scoping study to explore research methodology and draw preliminary conclusions. It has not considered how devolved administrations in the United Kingdom communicate climate change in their policy documents, nor has it undertaken textual or visual analysis of the substantive material available via the Met Office web page, or governmental press releases, or transcripts of speeches. The materials were sampled purposefully, often via objective internet search engines in order to reduce bias (while being aware that search engines can be biased), and the data and themes were discussed between the researchers to minimize individual subjectivity. There was significantly more communication material for the United Kingdom than Hong Kong (e.g., ~17 000 from GOV.UK as compared with ~1000 from GOV.HK), and, excepting social media, communication material in Cantonese was not included. Note that social media

freedoms are different in the United Kingdom and Hong Kong [see Luqui (2017) for the role of media censorship in Hong Kong]. A future study must undertake more exhaustive contents analysis of all governmental communication materials, including social media, press releases, and government speeches.

## 6. Conclusions

This study compares the modes and styles of climate change communication used by the U.K. and Hong Kong governments in order to address three research questions: 1) How do the governments communicate climate change? 2) How do the messages and methods differ between the United Kingdom and Hong Kong? 3) What can be suggested to improve their communication of climate change? Concerning question 1, both governments use similar means: policy, education, campaigns, internet, and social media, which are described in section 4 and summarized in Table 8. Addressing research question 2, these have different characteristics, and give different emphases in their climate change message. The United Kingdom is more prominent in its legally binding policy, and well-defined programs for adaptation and risk assessment, whereas Hong Kong has more effectively embedded climate change education in the school curricula and thereby its future decision-makers, and has a more centralized and consistently branded campaign, with widespread use of visual language, and increased focus on self-responsibility and behavioral change. These differences arise from the fundamentally different ways the two governments frame the problem and solutions to climate change. The U.K. approach considers climate change more a “traditional environmental problem” to which there are top-down scientific, engineering and policy responses. Contrastingly, Hong Kong approaches communication with a greater consideration of the science–society nexus and the role of personal responsibility, but without any top-down legal responsibility to undertake actions or meet targets. Accordingly, there are strong elements of best practice in both approaches, and the recommendations (research question 3) outlined in section 5b take these into account.

This novel scoping study provides an interesting and insightful reference for academics and practitioners in the fields of environment, health, communication, sociology, or psychology who are addressing climate change through better policy making and public communication. By considering climate change communication within the context of the problem of climate change inaction, governments can understand where there is scope to develop their approach to instigate action and gain insight into the effectiveness of their current materials. This study is therefore a useful resource for regional or national bodies wishing to develop climate change communication strategies. Further research should undertake questionnaires, interviews, or mixed methods to collect public feedback from the United Kingdom and Hong Kong to understand the effectiveness of government communication of climate change. It would also be pertinent to compare the methods and effectiveness between the government and other influential communicators of climate change, such as activists,

green groups, scientists, or the press within the context of inaction on climate change.

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*Data availability statement.* This study analyzed freely available documents and text from official government websites and social media outlets. Sources of information are cited in the text.

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