Explore incorporation of climate science into the Manx national curriculum

1. EXECUTIVE SUMMARY

1.1. The statutory curriculum for Isle of Man schools is laid out in the Curriculum Order 2011 and underpinned by the Department of Education, Sport and Culture (DESC) Essentials for Learning (E4L) curriculum, which provides a broad framework for essential academic, social and personal skills.

1.2. Curriculum content in the 37 Isle of Man schools (32 Primary, 5 Secondary) operated by the DESC is largely drawn from the English national curriculum. Curriculum content also draws on the Island's unique geographical, cultural and historic features.

1.3. Consistency varies regarding the delivery of climate science across the schools; however any teaching of climate change remains quality assured by the Education Improvement Service.

1.4. In the Island's primary schools, climate change is taught though a variety of topics based upon their individually determined curricula and it is likely that content and consistency varies across the schools.

1.5. In secondary schools climate science is covered within the Cambridge Assessment iGCSE Sciences Co-ordinated (Double) curriculum. Alternatively students may sit three separate science iGCSEs else BTech Science. The iGCSE Single and Combined Science Statements refer briefly to climate change and atmospheric carbon within Biology and Chemistry. Climate change is also covered in the GCSE geography syllabus, however this is not a compulsory subject.

1.6. The Island's only private school, King Williams College (KWC), curriculum adopts the International Baccalaureate Diploma - studied by all Sixth Form students – and where climate science is explored and embedded within both the Geography and Environmental Systems and Societies syllabi. In the Fourth Form and Lower Fifth (Years 7 to 9) KWC broadly follows the requirements of the National Curriculum.

1.7. United Nations Institute for Training and Research: as part of its 2011-2013 implementation phase "The One UN Climate Change Learning Partnership" (UNCC:Learn) developed a Resource Guide for Advanced Learning on Integrating Climate Change in Education at Primary and Secondary Level.

1.8. Effective outreach is required for students to understand climate science in easy to understand language and in a hands-on/visual environment. Isle of Man students are fortunate to have regular access and opportunity to engage with local environmental groups e.g. Manx Wildlife Trust, One World Centre, Beach Buddies

etc. Bringing the science to life within the fabric of the school/learning environment is also useful e.g. Queen Elizabeth 2nd (QEII) high school biomass boilers, solar panels, making sustainable clothing etc.

1.9. Climate change is a pervasive phenomenon that requires a multidisciplinary approach i.e. permeation across all areas of the curriculum so that it becomes natural and less daunting. For example, not just restricted to science or geography lessons but in home economics (change in food production, supply and diet), PSE (personal and social impact and concerns), language (mass migration), art (changing landscape) etc.

1.10. E4L provides flexibility to weave climate science through all elements of teaching however iGCSE appears to confine material to biology and chemistry.

1.11. Going forward, DESC plans to produce, in collaboration with DEFA, Manx Climate Science guidance pdf documents for all schools that are aligned to the UN Sustainable Development Goals (SDGs). DESC will also approach all Isle of Man primary and secondary Head teachers by the end of Jan 2020, to further discuss how climate science can be covered consistently.

2. SUMMARY OF FINDINGS

Current Provision for Climate Science on Isle of Man in the Department of Education Sport & Culture's (DESC) School Curricula

2.1. The statutory curriculum for Isle of Man schools is laid out in the Curriculum Order 2011 and underpinned by the Department of Education, Sport and Culture (DESC) Essentials for Learning (E4L) curriculum, which provides a broad framework for essential academic, social and personal skills.

2.2. Curriculum content in the 37 Isle of Man schools (32 Primary, 5 Secondary) operated by the DESC is largely drawn from the English national curriculum. Curriculum content also draws on the Island's unique geographical, cultural and historic features, particularly in primary schools where the curriculum delivery is largely devolved to Head teachers.

2.3. DESC school curricula is non-prescriptive and delegated to Head teachers, as such teaching staff have the freedom to deliver lessons relevant to the needs and interests of pupils in each school community. However, it also means that consistency varies regarding the delivery of climate science across the schools on the Island. Any teaching of climate change remains Quality Assured by the Education Improvement Service (in the absence of OFSTED in reporting in the Isle of Man).

2.4. DESC's E4L approach aims to encourage the development of the well-rounded child by teaching through the 'six Rs' – readiness, relationships that are positive, resourcefulness, resilience, remembering skills and reflectiveness.

2.5. E4L's aspirations are shown in Figure 1:

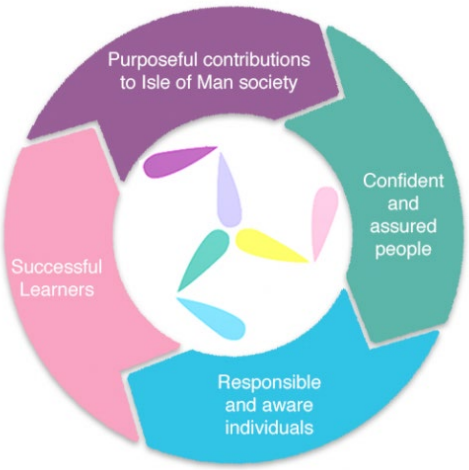

Figure 1: E4L's Aspirations.

2.6. This review identified that the teaching of climate science and/or change was not referenced within the Isle of Man curriculum statement. Following a consultation with DESC Educational Improvement Services, the E4L framework "Responsible and Aware Individuals" (E4l.sch.im, 2019)was updated on 12 September 2019 to incorporate the following reference:

> *"As UNESCO Biosphere Partners, all schools are engaged in making their environmental impact positive where possible and, as part of this, teach climate science and the importance of Climate Change to our young people at all ages."*

2.7. DESC must, by order, prescribe a curriculum which must be provided for all registered pupils of compulsory age at maintained schools. Within the draft Education Bill 2019, which will replace the current Education Act 2001, the curriculum provided for maintained schools is as extracted below:

29 The curriculum

(1) The Department must by order prescribe a curriculum which must be provided for all registered pupils of compulsory school age at maintained schools.

Tynwald procedure – laying only

(2) The curriculum must, in particular, —

(a) include education in religion, ethics and values, avoiding proselytising for any particular religion or religious approach;

(b) include education in Manx culture (including history and language);

(c) include age-appropriate education about sex and relationships, health and lifestyle, and economic and other wellbeing; and

(d) include opportunities for physical education (including games and sports).

(3) The curriculum may include arrangements for, —

(a) regular assessments, and

(b) access to public examinations, or participation in the attainment of qualifications, provided in the Island and elsewhere.

(4) The curriculum may include modifications and exceptions for pupils with additional educational needs.

(5) Before making an order under subsection (1) the Department may consult any persons it considers appropriate.

2.8. Whilst the teaching of climate science is not specifically referenced within the curriculum extract above it could arguably be captured within 2(c) under "*economic and other wellbeing"* which is closely aligned to E4L's "*responsible and aware individuals",* but a more specific reference to climate change and environmental sustainability would be necessary to clearly identify the requirement.

2.9. This report aims to review, document and assess current and planned provision of climate science within Isle of Man curricula/programmes. DESC invited primary Head teachers to provide evidence to inform the Climate Emergency Consultative Transformation Team (CECTT) and, as such, engage in shaping the curricula in the area of climate science in Isle of Man. Feedback was received from 18 primary schools (58%) and included examples of where climate change is explicitly included in their bespoke curriculums (including E4L). Curricula used includes:

- International primary curriculum.
- Cornerstones Education.
- Plan Bee.
- Global Learning Goals.
- Philosophy for Children (P4C).
- Self-organised learning environments (SOLE).
- Eco-Schools.

2.10. A list of climate change themes, delivered in primary schools through the frameworks highlighted above, are listed in Annex A. Feedback from primary schools also cited the external organisations they work with in order to effectively deliver learning aims as well as provide relevant extracurricular activities, including:

- Beach Buddies.
- Manx Wildlife Trust.
- Manx Whale and Dolphin Watch.
- Manx Birdlife.
- Eco Clubs.

2.11. Provision of climate science teaching in secondary schools is as contained in the iGCSE curriculum (as referenced below).

2.12. There is no specific curriculum for Isle of Man secondary schools as, under legislation, schools develop their own curricula within the parameters of the 2011 Curriculum Order (extract above). Climate science provision within DESC Secondary Schools for KS4 falls within the Cambridge Assessment iGCSE Sciences Co-ordinated (Double) curriculum. Alternatively students may sit three separate science iGCSEs else BTech Science. The iGCSE Single and Combined Science Statements relating to climate change or atmospheric carbon within Biology and Chemistry are as shown in Table 1:

Table 1: The iGCSE Single and Combined Science Statements relating to climate change.

	CORE	**SUPPLEMENT**
Biology	Describe the carbon cycle, limited to photosynthesis, respiration, feeding, decomposition, fossilisation and combustion; and List the undesirable effects of deforestation as an example of habitat destruction, to include extinction, loss of soil, flooding and increase of carbon dioxide in the atmosphere.	Discuss the effects of the combustion of fossil fuels and the cutting down of forests on the oxygen and carbon dioxide concentrations in the atmosphere.
Chemistry	State that carbon dioxide and methane are greenhouse gases.	State that increased concentrations of greenhouse gases cause an enhanced greenhouse effect,

		which may contribute to climate change.

2.13. Whilst the science specification statements provide an example of where most students would receive some teaching directly in relation to climate science, elements are also contained within the Geography syllabus at GCSE. Science is compulsory at KS4 (age 14-16) however Geography is not.

2.14. In March 2019, four Oxford school girls started a petition to make climate change a "core part" of the national curriculum. The petition recognises that climate change is already part of the science and geography curriculum in England, but that the students felt they had had very little opportunity to learn about climate change. It is difficult to quantify what, how much, when and where it is taught and will likely vary from school to school.

2.15. Independent education in the Isle of Man is provided by King William's College and the Buchan School (together "KWC"). The delivery of climate change in KS3 (11-14) and KS5 in KWC are discussed in the following section. Note the evidence gathered is largely subjective as a thorough review of individual schemes of work is likely required which has not been possible under the current time constraints.

Current Provision for Climate Science on Isle of Man Independent Schools Curricula

2.16. KWC's curriculum adopts the International Baccalaureate Diploma - studied by all Sixth Form students – and where climate science is extensively explored and embedded within both the Geography and Environmental Systems and Societies syllabi. In the Fourth Form and Lower Fifth (Years 7 to 9) KWC broadly follows the requirements of the National Curriculum.

2.17. In KWC climate science is taught in both the formal curriculum and in ad-hoc school projects and activities.

2.18. The International Baccalaureate is predominately project based. The international nature of the curriculum considers global environmental issues across a number of subject areas.

2.19. "Go Zero" concepts are also supported in subjects such as Design and Technology, Biology, Physics and Sports, Exercise and Health Science etc.

2.20. Lower school collaborative science project includes a review of the impact of current energy sources on the environment and considers alternative sustainable sources.

2.21. Innovative concepts are explored e.g. the use of Design & Technology to create and/or use existing mobile green applications (Apps) to track an individual's carbon footprint – are raised and discussed with students.

2.22. The quality and quantity of climate science teaching within KWC is subjective as individual teachers prepare their own schemes of work to support their delivery of the curriculum subject.

2.23. KWC aim to change from the Cambridge iGCSE curriculum to the "Edexel" curriculum/examination board with effect from summer 2021 on the basis that there may be more cross-curriculum integration of topics which may provide a stronger platform to lead into the International Baccalaureate. Schemes of work are therefore currently in the course of being written and, if the Isle of Man Government was to provide some high level direction in areas of climate science teaching, there may be an appetite to enhance/incorporate further climate science provision in student projects.

2.24. If specific guidance is provided in the form of, for example, sustainability goals linked to the Isle of Man environment and localised actions with an underlying consistency of message.

Integrating Climate Change in Education at Primary and Secondary Level

2.25. United Nations Institute for Training and Research: as part of its 2011-2013 implementation phase "The One UN Climate Change Learning Partnership" (UNCC:Learn) developed a Resource Guide for Advanced Learning on Integrating Climate Change in Education at Primary and Secondary Level (UN CC:Learn, 2019) .

2.26. The UNCC:Learn comprehensive guide provides educational planners and practitioners with a wealth of written resources, training courses and further reading ranging from:

- how to develop strategies and policies for implementing climate change education in schools;
- including arguments as to why mainstreaming and scaling up climate risk education should be targeted;
- good practice with regard to curriculum integration; to
- guidance to policy makers on how, why and where to adjust educational systems to incorporate climate change learning and foster immediate undertaking that leave educators and learners equipped with skills and knowledge in mitigating and adapting to climate change.

2.27. Themes contained within UNCC:Learn are common to The National Centre for Science Education's article Teaching Climate Change: Best Practice (Ncse.ngo, 2019) i.e. that in order to both improve and reinforce climate change education its needs to be made:

- Local;
- Human;
- Pervasive; and
- Hopeful

This is echoed by Allison Anderson in the research article Climate Change Education for Mitigation and Adaptation, in which it states: *"the evidence shows that educational interventions are most successful when they focus on local, tangible, and actionable aspects of sustainable development, climate change and environmental education, especially those that can be addressed by individual behaviour."* (Anderson, 2012).

2.28. UNCC:Learn supports "*As in all environmentally focussed education initiatives, climate change education must have a strong place-based local focus."* thus incorporating (for example) the Isle of Man's UNESCO Biosphere status into climate science could be just one of many ways Isle of Man schools could adopt this approach.

2.29. UNESCO – Associated Schools Project Network (ASPnet) published (Sept 2016) Resources for Education in Climate Change, and includes materials from UNESCO and other organisations for both classroom use and for the training of teachers and educators (UNESCO, 2016).

2.30. Manx Wildlife Trust ("MWT") already undertake work with Isle of Man schools that is firmly linked to the local environment and helpful to show student show climate change affects their surroundings e.g. Rock Pooling – studies carried out on the thickness of limpet shells due to wave energy; Carbon in eel grass and wetland areas; and Natural Habitats – talks (vary school to school).

2.31. In Years 7 to 9 (KS3: age 11-14) there is no external examination requirement therefore evidencing climate science would require individual review of schemes of work. Any adjustments to scheme of work for these year groups would understandably be time consuming; hence where specific purpose projects may be the preferred avenue to embedding climate science concepts and methodologies in Isle of Man secondary schools.

2.32. It may be beneficial to encourage climate science in non-timetabled activities with these cohorts, or example in cross-school debates and community engagement.

2.33. One area identified where teachers would welcome guidance, and which would inform and underpin consistency of message across Isle of Man schools, is the desire for an Island-wide guidance on actions residents can take to minimise their impact on the environment and climate change. For example: What can be recycled and what should go the energy from waste facility. Some insight into the potential

energy road map/future for the Isle of Man (which will hopefully follow from the CECTT Action Plan) would also assist climate curriculum.

2.34. Similarly, whilst all Isle of Man schools signed up to be "Eco Schools" there are no milestones or measurable actions required – this is something DESC is aware of and planning to remediate in this academic year.

2.35. It is important for students to realise that humans can take actions and that not all science is clinical or takes place in a laboratory but is an inherently human endeavour.

2.36. Effective outreach is required for students to understand the science in easy to understand language and in a hands-on/visual environment. Isle of Man students are fortunate to have regular access and opportunity to engage with local environmental groups e.g. MWT, One World Centre, Beach Buddies etc.

2.37. Bringing the science to life within the fabric of the school/learning environment is also useful e.g. QEII biomass boilers, solar panels, making sustainable clothing etc.

2.38. Climate change is a pervasive phenomenon that requires a multidisciplinary approach i.e. permeation across all areas of the curriculum so that it becomes natural and less daunting. For example, not just restricted to science or geography lessons but in home economics (change in food production, supply and diet), PSE (personal and social impact and concerns), language (mass migration), art (changing landscape) etc.

2.39. E4L provides flexibility to weave climate science through all elements of teaching however iGCSE appears to confine material to biology and chemistry.

2.40. The feeling of hopelessness, panic, anger, fear etc. about climate change has led to the mental health phenomenon known as "Eco-Anxiety" with international news channels including Reuters, BBC etc. dedicating coverage to it in addition to the medical journal "The Lancet". Allaying the emotional impact of learning about climate change it to integrate the science with solutions (Fawbert, 2019).

2.41. Increasing pupil concern and climate change awareness drives demand for educators to be increasingly informed in areas of climate science however few educators received formal training about climate science at teacher training college. Simple tools (e.g. the SAME World Edu-kit (Dec 2017) used in Europe to facilitate the inclusion of social and environmental topics in school curricula and raise educator awareness) whilst useful do not address the potential teacher training requirements.

Isle of Man Integration of Climate Science

2.42. DESC school visits to both Primary and Secondary Schools to further gather information are scheduled to take place between November 2019 and January 2020.

2.43. DESC have advised that all schools include some element of climate science in their curricula although establishing the detail will take some time.

2.44. Schools curricula content are assessed under the DESC's School Self Review and Evaluation (SSRE) framework insofar as a school must be able to demonstrate to what extent the curriculum:

- provides come flexibility and responds to the needs of pupils; and
- takes into account the context and needs of the Isle of Man global community.

Teacher/Educator Training and Awareness

2.45. As climate science spans multiple disciplines and is a rigorous subject, even in the absence of political and parental interference, cultural or personal values often interfere with acceptance of climate change. In response teachers across the UK are signing up in their hundreds to become UN accredited climate change teachers at their schools.

2.46. EduCCate Global, is working with the United Nations to update some of its training material into five free online courses for teachers.

2.47. In addition to the UNCC:Learn guide, Oxfam Education provides free Climate Challenge resources (aimed at 7 – 11 year olds) for use in activities (linking to curricular areas including science, English and geography) to explore the causes and human impacts of climate change, and to consider what action can be taken in response. The materials include tools to investigate the greenhouse effect and analyse carbon footprint date with use of a "consequence wheel" to encourage role play for students to explore how communities are being affected by climate change, responding and adapting to these challenges (Oxfam GB, 2019)

Ongoing Work

2.48. DESC plans to produce, in collaboration with DEFA, Manx Climate Science guidance pdf documents for all schools that are aligned to the UN Sustainable Development Goals ("SDGs"). The aim of the documents is to provide guidance and focus with relation to:

- areas of importance;
- facts relevant to Isle of Man;
- myth-busting methodologies;
- ensuring Climate Science is taught to a high standard and;
- ensuring Climate Science and related issues are taught with sensitivity (a sense of hope).

2.49. DESC plans to approach all Isle of Man primary and secondary Head teachers by the end of Jan 2020 – through individual school visits - to:

- discuss Manx curriculum initiatives;
- encourage registration as an Eco-school;
- discuss inclusion of sustainable development goals (SDGs); and
- how climate science can be covered consistently.

2.50. DESC will introduce Isle of Man primary and secondary schools to SDGs and accompanying online resources. Head teachers will not be instructed by DESC to use the online resources explicitly but as point of reference. DESC's aim is for schools to use SDGs as common themes consistent across climate science education.

2.51. DESC will also consider the descriptor in the DESC SSRE (School Self Review and Evaluation) toolkit i.e. "*the curriculum takes into account the context and needs of the Isle of Man and global community*" and how SDGs and climate science can be included in this area.

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Annex A

Climate change themes delivered to primary schools on the Isle of Man. This list is taken from feedback from 18 (58%) primary schools on the island and is not exhaustive.

- Protecting our Planet
- Human Impact
- Littering
- Climate Change – extreme weather
- Respecting Our Environment
- Plastic Pollution
- Deforestation
- Global Warming
- Managing the Environment
- Waste & Biodiversity
- Rainforests
- Pollution in our Seas
- Global Citizenship
- Environmental Awareness
- Recycling
- Reducing Plastics
- River Pollution
- Extreme Earth – Global Warming
- Ethical Trading
- Ecosystems
- Water Security
- Biodiversity
- Finite Planet
- Erosion & Weather
- Animal Adaption
- Marine Plastics
- Comparing Environments