**Evidence Gaps and Further Research Needs - update 31/3/2022**

| Research Area | Research required | Update |
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| Determine more robust costs and expenditure profile. | Expert financial analysis of each action, improving the data available on costings, carrying out appropriate financial modelling and considering interdependencies of actions. Detailed research on options for funding the delivery of the full plan, including scope for implementing new taxes and levies (including a carbon tax), government bonds, determine taxation regulations and opportunities for 'ring-fencing' funds for decarbonisation. | Detailed financial analysis of transition not possible until key policy decisions, such as technologies for decarbonising our electricity supply, are made.<br><br>The draft Isle of Man Climate Change Plan 2022-2027 commits to a Funding Strategy being produced as a priority. |
| Start peatland restoration. | Full restoration plan requires survey of peatland condition and sources and sinks identified. | The proposed land management plan will identify and recommend action where peatland restoration is a viable option. The Peat Restoration Project began early in 2021 and will continue to be delivered by the Department of Environment, Food & Agriculture (DEFA) alongside their business-as-usual activities. |
| Start woodland planting. | Further research, planning and assessment is required prior to wide-scale woodland and semi-natural habitat creation to determine the best areas, to avoid negative impacts and ensure long-term viability and climate change resilience. | The proposed land management plan will identify and recommend action where woodland restoration is a viable option.<br><br>A working group from across Government has completed a specification for commissioning a comprehensive Land Management Plan. This plan will identify key opportunities and risks around land management for carbon sequestration and for emissions. |
| Model future electricity grid requirements. | Detailed modelling of future electricity scenarios. | A high-level stability power systems analysis model was developed in 2021, using the software, ERACS by Manx Utilities in partnership with RINA. Arup were able to utilise the model to support the Future Energy Scenarios Report. This model covers the transmission network and HV distribution network and Manx Utilities retains use of this model.<br><br>A separate study was completed by EA in 2019 to cover expected uptake of Heat Pumps and EVs. We are also having some additional modelling done following the Renewable Heating Scenarios work. |
| Provide planning advice on ecosystem service gain. | Research into effective schemes elsewhere and appropriate content for IOM. | Work is on-going with planning policy officers to inform how the amendments to planning legislation comprised within the Climate Change Act 2021, in relation to a range of climate change concerns, can be implemented. |
| Develop a Sustainable Drainage (SuDs) policy. | Research specific carbon sequestration rates for individual SuDS elements relevant to temperate/UK climates. | A new IOM SuDs policy is being finalised by DEFA in conjunction with the DoI and MU. This policy will encourage the use of SuDs in new developments and allow their adoption |

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| | | by the most appropriate body, which for the majority will be MU. |
| Publish a re-skilling strategy and action plan for a green economy. | Research net zero pathways and associated skills and support needs. | The outcomes of this research identified that the strategic direction for Energy, Transport and Buildings should be established before creating a re-skilling strategy. |
| Introduce a single-use plastics ban. | Quantifying carbon benefits of plastics ban. | DEFA consulted on regulations to prohibit the sale and distribution of certain single-use plastic items in 2021 and the regulations are expected to be laid before Tynwald for approval in May 2022. |
| Launch domestic energy-efficiency scheme. | Full consideration of costs, benefits and wider social, economic and environmental implications of scheme. | The Green Living Grant (GLG) Scheme was launched in October 2021, and it aims to provide island residents with financial assistance to reduce carbon emissions and household energy bills. The grant provides a financial contribution of up to a maximum of £6,000 per property, to date there have been 1400 applications. Domestic Home Energy Assessors have been appointed and audits have commenced. At the date of writing this no funds for the scheme have been accessed yet. It is expected that the Scheme could significantly lower emissions in around 1,200 properties and save nearly 100,000 tonnes of CO2 entering the atmosphere. |
| Revise MUA practices to encourage diversified generation – may require legislation. | Assessment of what is required to enable diversified generation and what the implications will be for enabling this. | MU have started work on a joint venture with DOI which will enable a roll-out of small-scale renewables across the government estate and internal Future Generation Delivery Strategy is also looking at diversification options, building on the work by Arup. There will be proposed changes to the Electricity Act to allow for renewable generation, this is in progress. |
| Call for expressions of interest for provision of onshore wind & solar capacity (150MW & 50MW). | To understand the actual cost of energy for onshore wind in Isle of Man, carry out business appraisal of windfarm sites. Research to understand key environmental issues. | The Future Energy Scenarios (FES) report showed neither of these were economically realistic due to on-island economic uplift and lack of export opportunity (the capacity of wind and solar proposed would be greater than island demand so we would have to constrain them and balancing costs as we know are high). The existing Mott McDonald report suggests that 20MW is the max. realistic renewable capacity. Several businesses are looking at renewables for off-grid systems. |
| Feasibility + call for expressions of interest in geothermal energy. | Further research into viability of geothermal in the Isle of Man. | Geothermal is not viable on the Isle of Man as we have no recent igneous intrusions. Deep-well Geothermal energy may become viable in the distant future, but technology must shift substantially. The current UK geothermal projects (which do have access to shallow heat) are currently |

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| | | struggling to produce sufficient steam quality for power generation. However, geothermal energy for heat systems could be more realistic. This would still be challenging on IoM and was ruled out of Gemserv's analysis as well. |
| Launch time-limited subsidy scheme for electric vehicle purchase | Acknowledging that the market through which we purchase electric vehicles is already subsidised, continue to track the electric vehicle purchase trends in the Isle of Man and if appropriate identify alternative means to stimulate market growth. | This will be considered as part of the Transport Decarbonisation Scenarios which will be undertaken by this year. Work is currently in progress with DOI and MU. |

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| Research Area | Research Required | Update / Comment |
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| Map habitat connectivity opportunities. | More detailed work on habitat mapping and connectivity opportunities | This will be undertaken as part of the proposed integrated Land Management Plan. |
| Increase active travel in all locations; strengthen planning guidance. | Research into active travel constraints and opportunities outside the current Douglas-centred work. | We have fed this important piece of work through to the Climate Change Plan 2022-2027. Currently the Active Travel Strategy is owned by DOI and they have been implementing the strategy across the Island |
| Agri development scheme includes agri-forestry, produce diversification, innovation in livestock management, precision agriculture, energy generation, direct marketing to customers. | Feasibility and costing assessments for all/most appropriate options. i.e results based payments, high nature value farming payments. | Within the Climate Change Plan 2022-2027, actions to develop both the effectiveness of the AES to support emissions reduction and an agricultural emissions reduction strategy will be undertaken. This will include the feasibility and costing of any recommendations. |
| Climate change in curriculum in schools. | Further research into most effective way to deliver climate science and action education and training of educators. | This was an action in the Phase One Action Plan and has also been carried through to the Climate Change Plan 2022-2027 |
| Promote public transport. | Build on existing work into constraints and opportunities for higher uptake of public transport. | This has been carried through to the Climate Change Plan 2022-2027 |
| Review Dept for Enterprise business support schemes to promote energy/resource efficiency. | Research into local context and international experience in business incentives. | The Department for Enterprise provide a loan of £20,000 to support businesses move to a low energy transition |
| Enhance blue-carbon assets; deliver a marine management plan. | Full audit of blue carbon capacity and potential. New survey work building on benthic habitat map and analysis of carbon potential. | This was an action in the Phase One Action Plan and the audit is currently underway |
| Launch subsidy scheme to replace oil-fired heating. | Full assessment of options to deliver this in the most cost-effective way. | The Green Living Grant provides assistance for homeowners to replace oil-fired heating in homes rated 'D' or under with low carbon alternatives subject to means testing |
| Circular economy bill. | Research opportunities for circular economy in Manx context and whether this can be enabled through a single Climate Change Bill. | This was not taken forward, although proposals around a circular economy are contained in the Climate Change Plan 2022-2027 |
| Climate adaptation bill. | Extensive research required on current adaptation, gaps in provision and future needs and whether this can be enabled through a single Climate Change Bill. | This was not taken forward, although adaptation is a workstream in the Climate Change Plan 2022-2027 |

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| Complete grid strengthening and smart grid management, including battery storage | Further research and modelling of future grid requirements and storage opportunities. | Manx Utilities have taken this action forward |
| Encourage distributed energy generation. | Further work on wider requirements & implications of community generation. | This was considered in the Ove Arup Future Energy Scenarios work |
| Call for expressions of interest in vehicle charging network. | Research into the most effective approach to vehicle charging, considering private, public and consumer provision and considering wider interdependence and opportunities. | This will be picked up by the Transport Decarbonisation Scenarios work due to be undertaken this year |
| Heat from energy-from-waste (EfW) plant now utilised. | Additional work to understand capacity for this, including calculation of EfW renewable energy based on waste feedstock analysis. | This was not taken forward |
| Consider legislation for oil-fuel levy if oil-heated property conversions are stalling, & increase vehicle tax for fossil fuelled vehicles if progress is slow. | Further research most effective approach to regulating fossil-fuel heating and wider implications in terms of social impacts, commercial implications etc. | This will be picked up in the Climate Change Plan 2022-2027 |
| Electrification of public vehicles. | Further research required, e.g on leasing possibilities and alternative approaches. | This will be picked up by the Transport Decarbonisation Scenarios work due to be undertaken this year |
| Diesel power station running on biodiesel, or decision to decommission. | Practicalities regarding the introduction of biofuels in the short term to reduce emissions. Wider implications of decommissioning. | This work has recently been commissioned by Manx Utilities |
| Create strategic drop-in business hubs. | Research into most effective approach, market research into interest etc. | This was not taken forward |
| Review and decide on feasibility of hydrogen production by hydrolysis. | Results from technical trials in the UK; financial impact assessment of CCGT conversion to hydrogen in £ per kWh. Need to establish optimal mix of renewable electricity generation capacity, hydrogen generation capacity and hydrogen storage capacity. | Hydrogen technology is something we are watching closely. We know that the CCGT can operate at 5% hydrogen blend but hydrogen has been discounted for domestic use in heating. |
| **Additional research required and not highlighted elsewhere** | | **Update** |
| Addressing the recommendations in the Aether report to improve the quality of emissions measurement and reporting, to provide a more accurate baseline to inform future action. | | This was undertaken in 2021 when a full data review was conducted internally |
| Well-researched, Manx context information to inform the public website to help individuals and businesses make the right choices in terms of travel and transport, heating, energy efficiency etc (e.g. evidence-based home retrofit advice tailored to Manx traditional buildings and sensitive to heritage/conservation status etc). | | This was undertaken in September 2021 when we launched the new website, netzero.im |
| Understanding options for higher production and wider variety of vegetable/fruit/cereal production; promote self-sufficiency (this links to wider emissions cutting and to climate change adaptation for the Isle of Man). | | To be considered as part of the recommended agricultural emissions reduction strategy. |
| Study comparing emissions associated with travelling from the Isle of Man to popular destinations by ferry, air, car and public transport, and identifying the lowest carbon options. | | This was conducted internally, with ferry and rail being the lowest carbon option |
| Consider low carbon options for vehicles in fishing and farming, suitable in the Manx context. | | Options to reduce emissions from fishing vessels and farming vehicles are to be considered as part of the recommended agricultural emissions reduction strategy and fishing industry review respectively. |
| Exploring opportunities and challenges for proactively managing mental health in relation to climate change, in a Manx context. | | We have carried this forward to the Climate Change Action Plan 2022-2027 |

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| Explore the benefits of the Manx natural environment in wellbeing, in the context of climate anxiety. | We have carried this forward to the Climate Change Action Plan 2022-2027 |
| Consider approaches to fuel poverty in the context of climate change and reaching net zero. | This was considered in the drafting of the Fair Change Commitment, which forms part of the Public Sector Guidance |
| Assess potential for heat pumps on rivers, sewers and in the sea | No recommendations were made in the Gemserv renewable heating scenarios. |
| Study of Isle of Man aviation emissions and how they can be reduced. | This was not completed |
| Study of the emissions implications of hydrocarbon extraction in Manx waters, and the potential impact on reaching net zero. | This was completed with extensive research undertaken to help advice Comin and DOI on the emissions implications |