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Title

‘What future for the energy-rich Scottish North? Changes in the economic landscape of the Highlands and Isles, and the rest of Scotland’

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1. Introduction

In recent years, the Scottish Government has promoted marine renewable energy technologies (MREs) as a way to achieve energy security, economic development and environmental sustainability (The Scottish Government, 2010; 2011).² MREs play a pivotal role in the ambitious plan of the Scottish government to supply 100% of electricity demand from renewable resources by 2020 (FREDS, 2004; IPA, 2010; Allan et al., 2014, Scottish Government, 2011). The vast majority of suitable resources for wave and tidal technologies are located off the shores of the Highland and Isles region (HIR), reflected in the substantial plans for project development in these areas (Figure 1). Capturing sub-regional benefits, in addition to national economic contribution, is of major significance for policymakers and developers alike, because of the socioeconomic fragility of the HIR region (HIE, 2011; EPIC, 2012).

² Include offshore wind, tidal and wave energy technologies.

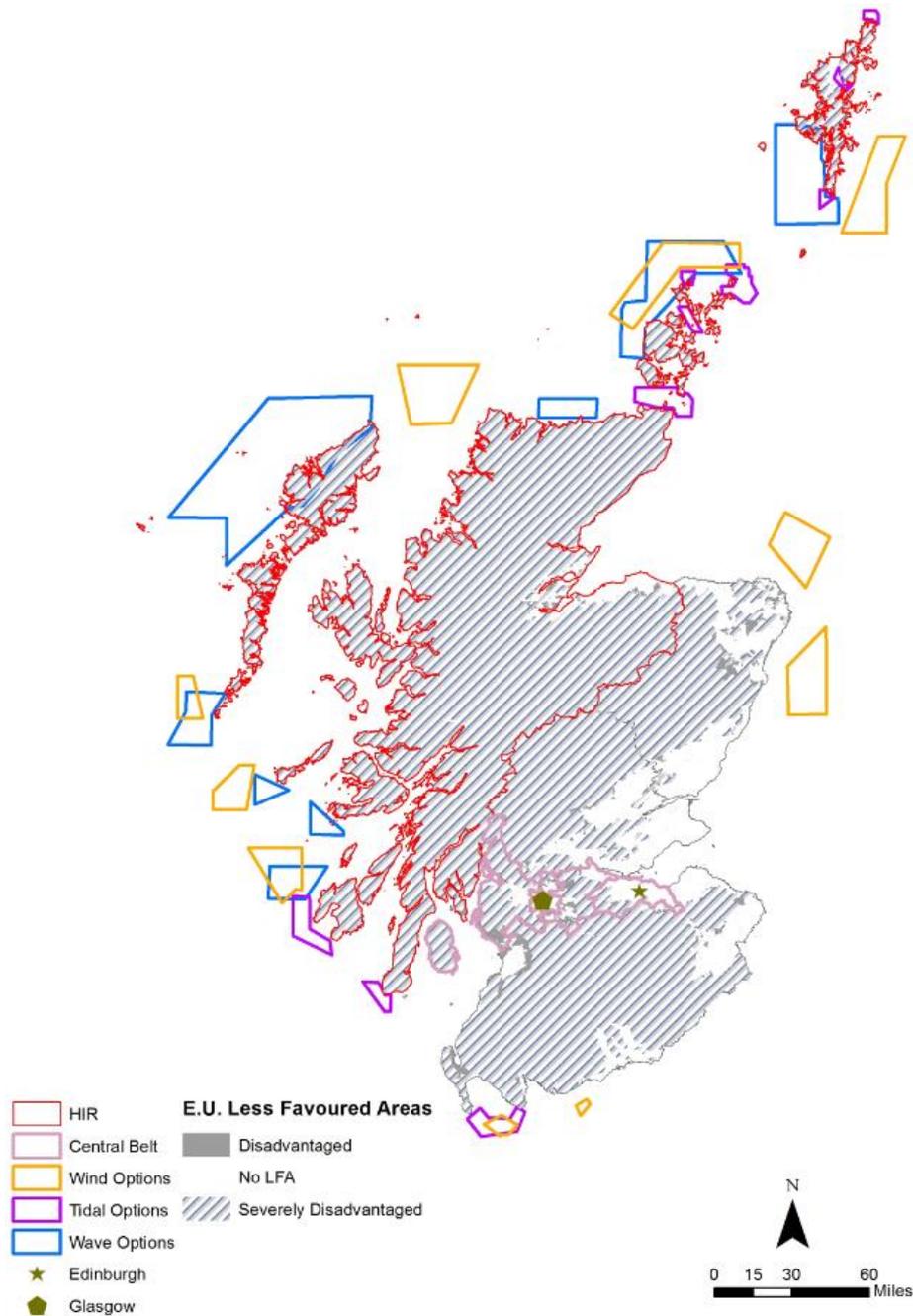


Figure 1 – Map of Scotland with Identified Potential Site for MREs, and Less Favoured Areas³

Despite recent efforts to establish best practices for community engagement, the Scottish and the UK governments currently implement a market-driven, top-down approach to planning the MRE sector (Johnson et al., 2012; The Scottish Government, 2014; Chronopoulos et al., 2014). Two jurisdictions, Shetland and Orkney (S&O), have attracted several investors using the energy produced

³ Based on EU (1999) and Bexter et al. (2011).

to enhance their local economies. Deploying MREs across the HIR is dependent on large-scale transmission upgrades for reaching the final demand, which is mostly located in the south of Scotland (The Scottish Government, 2013). The current approach of the Scottish Government to MREs replicates the paradigm that has characterized the relationship between the HIR and the rest of Scotland for the past 250 years (Richards, 1982). We name this paradigm, ‘*Megalopolis*’ after the work of von Glasow et al. (2013). We identify Megalopolis as the area stretching between Glasgow and Edinburgh, known as the ‘Central Belt’. (The Scottish Government, 2004; SNS, 2014).

In the present work, we argue that the Megalopolis paradigm has generated a *conundrum* for the development of MREs in Scotland, and one that cannot be solved solely through the devolutionary approaches of the 1970s. To solve the *conundrum*, we introduce the *Diffused Inclusive Community Entrepreneurship Paradigm* (DICEP). Finally, we identify examples of policies and societal responses which could be institutionalized and replicated through DICEP.

2. Towards the Conundrum

Since the 1700s, the HIR has supplied natural resources to the rest of the UK, as depicted in Figure 2, based on Lea (1969), Richards (1982) Epperson (2009).

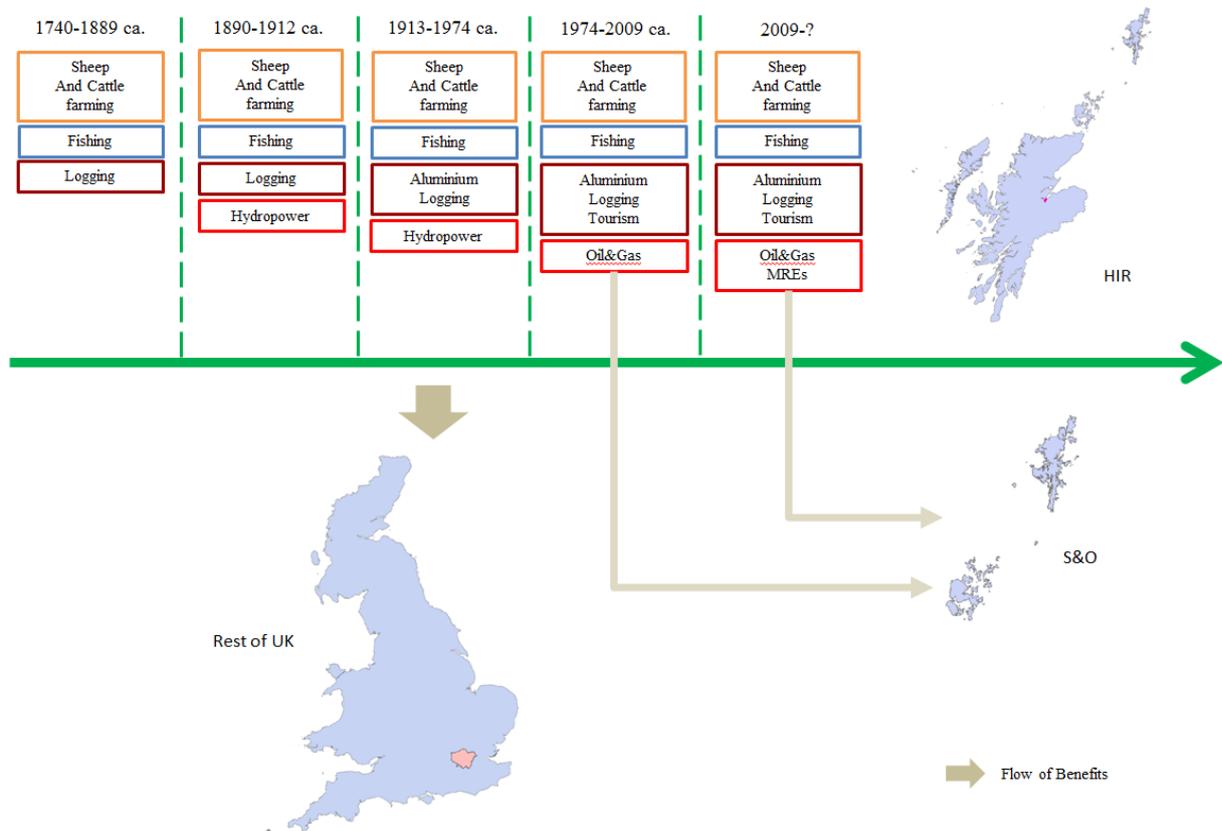


Figure 2. Timeline of major trade flows and benefits from HIR to the Rest of UK.

The adoption of the *Orkney and Zetland County Council Acts* in 1974 was the first successful attempt from any HIR community to capture part of the wealth generated from natural resources (Johnson et al., 2013). In the 2010s, with governmental support, S&O have embraced MREs, creating the European Marine Energy Centre (EMEC), along with several community-owned projects. The adoption of MREs by S&O councils builds upon the experience matured during the past 30 years (Johnson et al, 2013). Currently, the expansion and the distribution of MREs benefits across the entire HIR are limited by conflicting objectives among different stakeholders operating at different scales, which we define the ‘conundrum’ (Figure 3).

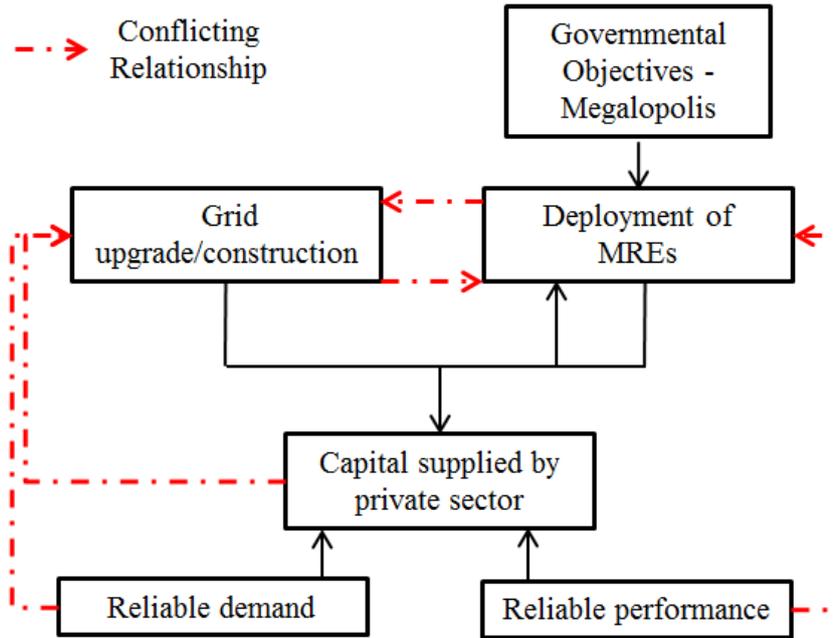


Figure 3. The Conundrum

The *conundrum* is jeopardizing the developmental capabilities of the HIR. Strategic upgrade of electricity infrastructure requires private capital for accommodating and distributing the electricity produced in the HIR waters nationally (The Scottish Government, 2013; Johnson et al, 2013; SSE, 2014). To make these investments attractive, and to reach the strike price for selected MREs by 2017, more deployment is required (Krohn et al., 2013; The Crown Estate, 2012). However, the uncertainty related to grid development and lack of alternative, local demand due to the southern-centric bias can limit investments in development of the grid (Ofgem, 2014). Consequently, achieving governmental renewable energy objectives can be severely delayed.

3. Beyond the Conundrum: DICEP

To unlock the *conundrum*, DICEP foresees the implementation of institutional, stable support for linking the supply of power, to local demand of energy for sustainable development. The paradigm has four characteristics, described in Table 1.

Table 1. DICEP Characteristics and Objects		
Characteristics	Object	Contextual Reference
<i>Diffused</i>	Distribution of benefits	
	Distribution of MREs	

Distribution of experience		
<i>Inclusive</i>	Institutional Framework	Acemoglu and Robinson, 2013
<i>Community</i>	Local engagement	Johnson et al, 2013
<i>Entrepreneurship</i>	Proactive communities - MREs for reducing socioeconomic fragility	Dees, 2001; Fuchs and Hinderer, 2014

DICEP requires organizational entities, whether formal or informal, within which individuals operate. A community will actively influence its landscape using the change, creating monetary, ecological and social wealth for its members as the landscapes change (Figure 4).

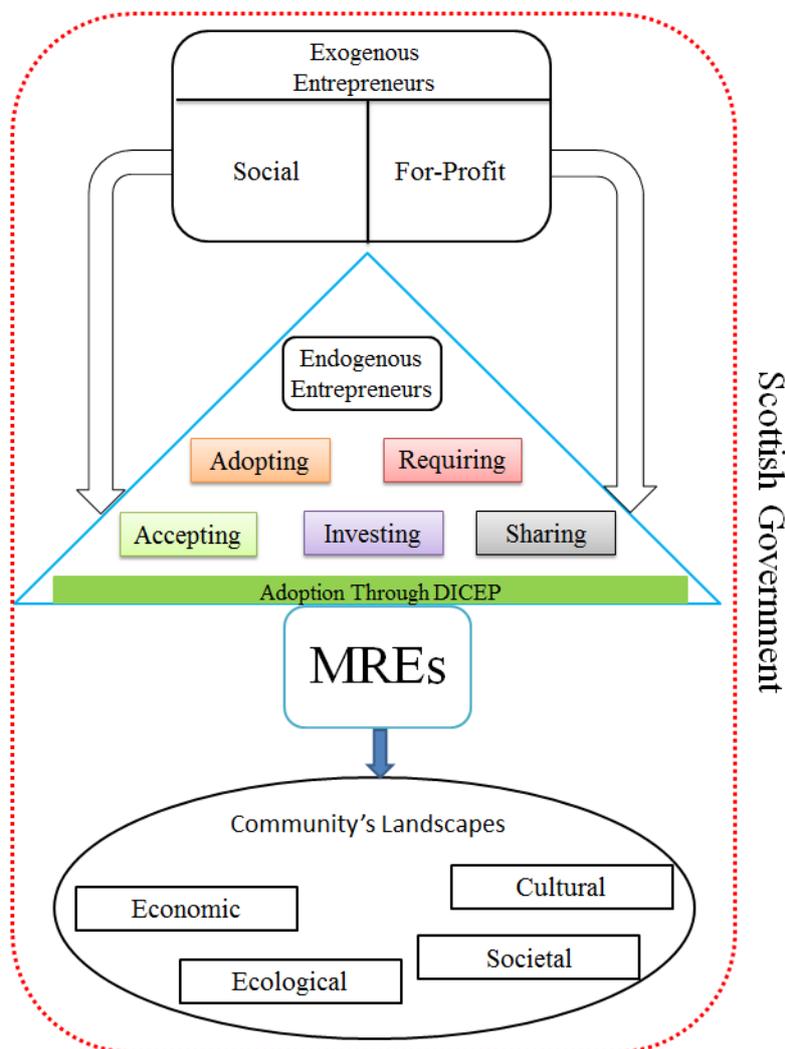


Figure 4. The position of DICEP in the modification of communities' socio-ecological landscape

Exogenous entrepreneurs act through DICEP. Endogenous entrepreneurs are members of the community, operating within the DICEP, and acting like internal engines, not only contributing to the

adoption of MRES, but, more importantly, using the energy generated for new economic activities. The adoption of MREs impacts the community's landscapes, which allow for new entrepreneurs to rise, establishing ways to exploit local energy. Differently from Megalopolis, DICEP offers a solution to the *conundrum* creating local demand for energy. In DICEP, the Scottish Government has three roles: planner/regulator, facilitator, and funder. As planner, the government sets the long-term, national goals for energy use. As facilitator, the government sets the legal framework to empower local communities. Finally, the government funds the harvest and local use of energy, combining support for harvesting energy with its uses within the community, thus reducing reliance on future grid developments. Through this combined support to energy supply and demand, DICEP will initiate an endogenous transition towards sustainability (Fuchs and Hindererm, 2014).

DICEP will prepare communities in the HIR to organize and benefit from this further expansion, creating locally-driven economic development (Figure 5). The new paradigm connects Megalopolis to a paradigm further in time, when grid connections will be completed, and transmission technology will allow efficiently supply of power.

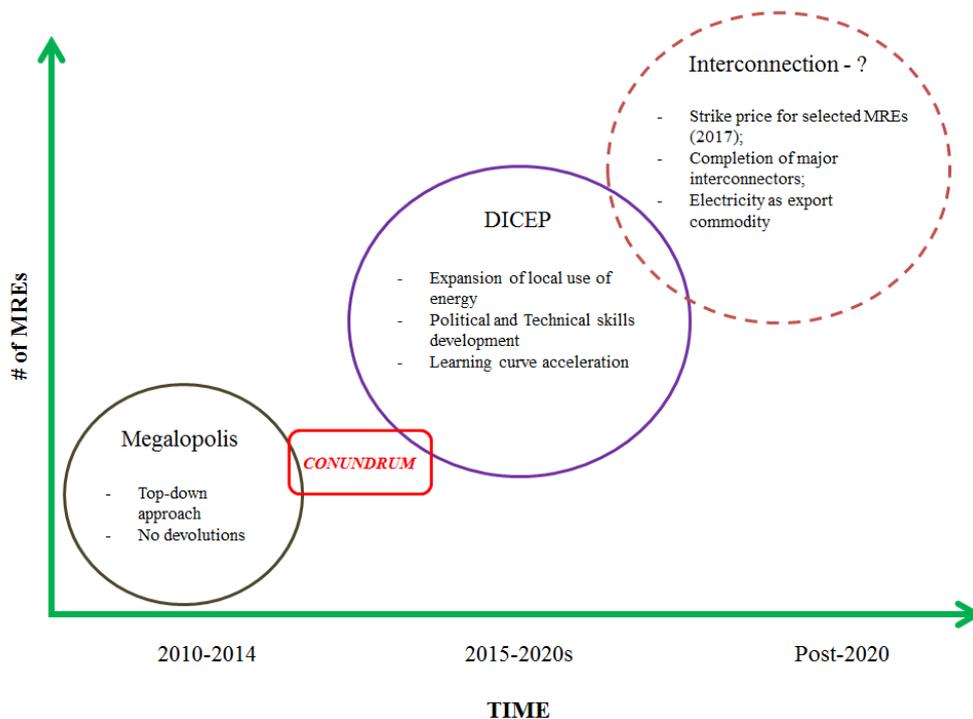


Figure 5. – DICEP as a Step towards the Future

4. DICEP at Work: Policies and Communities

We briefly present and compare two cases of implementation of renewable energy technologies: the first, based in Yell, Shetland, embodies a DICEP community; the second, Lewis Wind Farm, Isle of Lewis represents an example of Megalopolis. North Yell Development Council, Shetland installed a 30kW tidal turbine, owned by Bluemull Tidal Energy Ltd in March 2014. The 30kW turbine will supply up to 30 homes and the locally owned ice factory. Funded through various public programs, the project is the world’s first community-owned tidal device (The Scottish Government, 2014b), proving that new energy technologies can be embraced by communities, enhancing local economic resilience. Lewis Wind Farm was a plan to build the largest, privately-owned, terrestrial wind development in Europe (The Scottish Government, 2008) on the protected peat moors of central Lewis. The plan was rejected as the government received 10,826 letters against the proposal (Pasqualetti, 2011). We identify the major differences between the two projects in Table 2.

Table 2. Salient Characteristics of Bluemull Tidal Energy and Lewis Wind Farm

Lewis wind farm (Megalopolis)	Bluemull Tidal Energy (Aspect of DICEP)
Privately owned	Community owned (D and C)
Large-scale	Small-scale (D)
Rejected by the local community	Accepted by the local community (C&E)
Rejected in the planning process	Planning permitted (C&E)
Unknown local social and economic benefits (LWP,2004)⁴	Known local social and economic benefits (E)

In proposing the transition to a new paradigm, DICEP, we recognize the existence of case studies, policies and tools. Among others, we identify the following:

- *Marine Spatial Planning*: a developing, integrated approach to planning marine resource use, with emphasis on local stakeholder involvement. It provides a framework for visualising

⁴ The socio-economic analysis conducted by Lewis Wind Power showed a decent amount of community benefits. However the accuracy of the environmental statement was questioned enough by the RSPB that they commissioned an independent review (DTZ, 2007).

locally-appropriate energy scenarios, balancing this against other policy socio-environmental objectives within a region. Critically for DICEP, it also provides a platform for community engagement and through regional Marine Planning Partnerships.

- *Informal forum for communities* to share experiences and socio-institutional learning, similar to Community Energy Scotland (CES). CES is a charity established to help communities to introduce renewable technologies into their economic portfolios (CES, 2014).
- *New forms of partially-devolved powers* to retain and use locally sourced revenues (Johnson et al., 2013).

Developers need to look at their management plans through a local lens of history, place attachment, culture and heritage, especially in places where identities are strong, as in the HIR. Failing to do so, often results in failed projects (Aitken, 2010). Current policies do not include *phasing in* of MREs. DICEP promotes a phasing in process, allowing MREs to become common-place or societal norms rather than objects of opposition, forced upon rural communities. Through the change in the relationship between community and MREs project, DICEP provides the link towards a nation-wide transition towards renewable power generation.

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