



East of England Region

Action Plan to Support Regional Implementation of the Net Zero Strategy Objectives through an Environmentally Compatible Energy Transition



Project: IRENES

Integrating **RE**Newable energy and **E**cosystem **S**ervices in environmental and energy policies

Partner organisations concerned: University of East Anglia & Anglia Ruskin University

Country: England **NUTS2 region:** East Anglia

Contacts: Professor Andrew Lovett & Paul Bourgeois

Email addresses: a.lovett@uea.ac.uk & paul.bourgeois@aru.ac.uk



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EXECUTIVE SUMMARY

“Energy cannot be created or destroyed; it can only be changed from one form to another.” (Albert Einstein). This law of the conservation of energy chimes with the imperative the world faces in pursuit of clean and renewable energy, transitioning from fossil fuels, to sustain our economies and reduce climate change impacts.

However, the transition to a net zero world is complex and involves human decisions at all levels based on data and evidence that is clear and acceptable by different communities and stakeholders. IRENES has negotiated a shared approach across European partners to plug the gap in information about comparative benefits of land-based renewable energy and other land uses, and the land’s natural assets.

The East of England has a long history of ingenuity in battling with the lack of water, as the driest part of the UK, yet threatened by inundation of water into land as low as 2.75m (Holme Fen, Cambridgeshire) below sea level. Irrigation and drainage schemes have interplayed with an evolving understanding of nature to bring fertile lands to feed the region and the nation as the bread basket of England. So, it is perhaps unsurprising the region leads the UK’s part of the IRENES project in pursuit of innovative research, methods, tools, maps, communication and stakeholders in pursuit of policy for environmentally compatible energy transitions.

At the heart of IRENES is the concept of ecosystem services. These are the benefits from natural environment ecosystems for our human wellbeing. To realise the benefits, we must continue to learn and apply our understanding – not least in the integration with renewable energy in competing land uses.

Despite the pandemic the five partners have engaged in ‘site visits’ and stakeholder events to develop a shared methodology and gain real insight from projects in the field. A real strength has been the iterative folding in of stakeholder communities’ wisdom in parallel with desk research and the consideration of extant policies, alongside powerful mapping representations of trade-offs and synergies between renewables and benefits of natural assets across the regions. The German-led Energy Game, seeing the real-time inter-regional exchange amongst the players in deciding the locations/ impacts of different renewables, sparked a desire to develop this further as a tool for policymakers and planners.

The exciting prospect for a Local Energy Data Intelligence Centre (LEDIC) is proposed for the East of England as a direct legacy of the IRENES project. Working alongside regional and national organisations, LEDIC will support policymakers, infrastructure and renewable energy planners, and communities with energy / land use analyses and data sets.



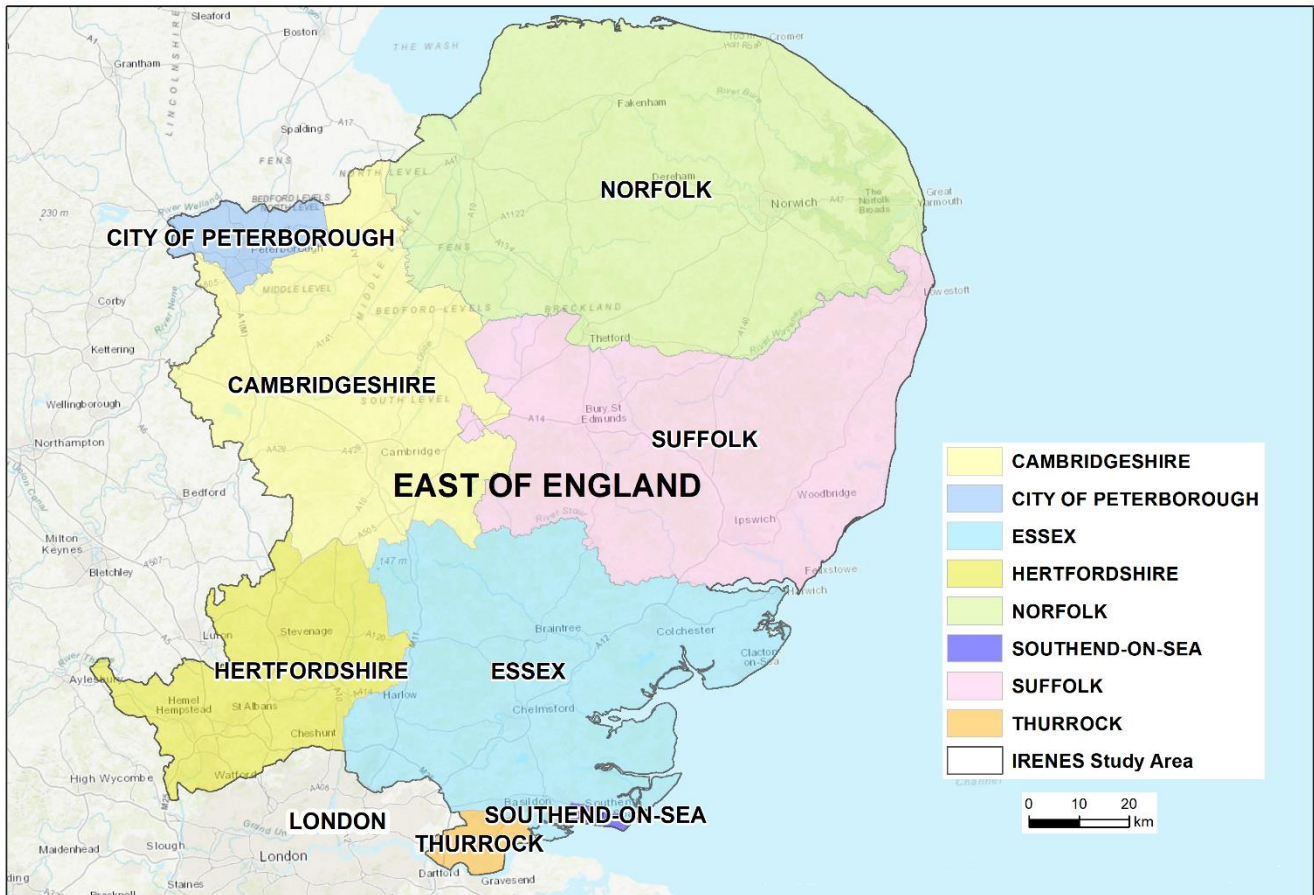
Additionally, it could help develop more sustainable and sensitive commercial judgements for the benefit of the economy, environment and common good.

A final word to the way IRENES uses mapping intrinsically to represent spatial relationships, but also influence – a crucial part of the mission. “Maps have inherent credibility. We are trained since childhood to rely on maps.” (Paul Mode, 2015). IRENES Geographic Information System (GIS) mapping has transcended the bounds of remote working and international contexts to engender co-production of continued learning and policymaking impact. This will be centre stage in our next steps.



PART I – BACKGROUND INFORMATION

The University of East Anglia and Anglia Ruskin University are both located in the East of England. Our regional focus encompasses five counties and three unitary authorities as shown in the map below. Overall, the region accounts for nearly 14% of the land area and 10% of the population of England.



The energy sector (both onshore and offshore) has long been an important feature of the regional economy. From the 1970s this was associated with oil and gas extraction in the southern North Sea and in the past two decades there has been substantial investment in offshore wind farms, with the expectation that generation capacity will exceed 10 Gigawatts (GW) in next decade. Electricity generation from land-based renewables (e.g. onshore wind, solar photovoltaics and biomass) has also increased and now represents over 40% of annual electricity consumption in counties such as Cambridgeshire and Norfolk¹. The use of hydrogen as an additional form of renewable energy is also being actively pursued². All of this means that renewable energy features strongly in local economic development strategies³ and in a variety of local government initiatives^{4,5,6} to address the challenges of climate change.

This action plan has been developed from the Interreg Europe IRENES project (Integrating RENewable energy and Ecosystem Services in environmental and energy policies) which specifically looks at the



interactions, synergies and trade-offs associated with deploying land-based renewable energy systems and the other potential uses and benefits of the land they are situated on. The main goal is to improve the integration of these aspects of land use in plans and policy instruments, particularly those concerned with decarbonisation objectives.

By comparing and contrasting the challenges and approaches in each of the five European regions that are partners in IRENES (Veneto (Italy), Lower Saxony (Germany), Estonia, Romania and the East of England), the learning derived has resulted in an enhanced understanding and deployment of a range of pilot initiatives to greatly improve the way the multiple uses and values of land are considered by stakeholders and decision makers.

Our UK Action Plan has been particularly influenced by research and publications by partners at the University of Hannover for the German Federal Agency for Nature Conservation on an environmentally compatible energy transition^{7,8}. Especially valuable was the online job shadowing organised on 16th November 2021 by the German IRENES project partners who demonstrated the Energy Game tool they have used for enhancing the decision-making process. This allows participants to investigate (in real time) the siting of different renewables technologies to meet electricity generation targets in an example community.

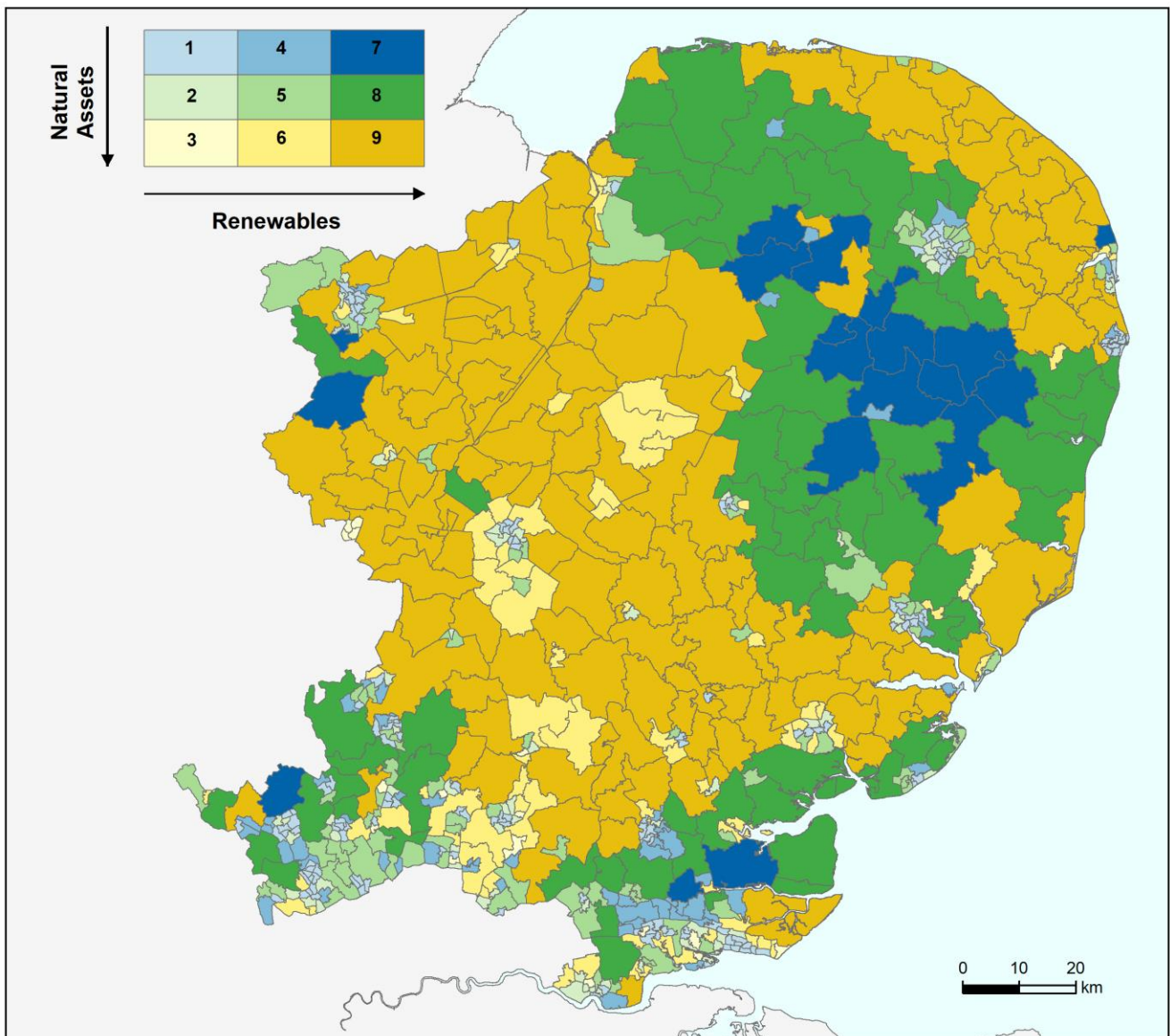
In the first part of the project, each of the partners undertook a State-of-the Art (SOTA) analysis on Renewable Energy Sources (RES) which was based on a shared methodology, considering both the regional/national regulatory framework and the renewable energy generation potential. Geographical Information Systems (GIS) techniques were then used with a variety of spatial data to produce specific constraint maps and generation estimates. These outcomes were subsequently discussed with relevant stakeholders (e.g. energy businesses, regional agencies and local government) to better understand some of the challenges associated with increased use of renewables.

A SWOT analysis was also carried out to review current policy instruments and assess their strengths and limitations. In particular, the assessment focused on awareness of the interactions between renewable energy generation and other potential land use benefits (e.g. different ecosystem services) in the documentation associated with the policy instruments.

The third phase of analysis involved extending the use of GIS to map the extent of Trade-Offs and Synergies (TO&S) between the use of renewable energies and other benefits from natural assets in each region. Several possible methodologies were reviewed, but ultimately a relatively simple approach of classifying areas to highlight landscapes with multiple potential uses was found to be particularly useful in discussions with regional stakeholders. An example of such output for the IRENES study region is shown on the next page.



In this map, over 660 'neighbourhoods' (Middle Level Super Output Areas) have been categorised based on their renewable generation potential and the presence of a set of natural asset indicators. These classifications have then been cross tabulated to derive nine groups. Category 9 represents high potential on both indicators (i.e. trade-offs will exist in increasing renewables-based electricity generation in these areas). In contrast, Category 7 is high for generation potential but relatively low on other natural assets.



All these analyses have benefited from a series of online technical meetings between the IRENES project partners, as well as several interregional 'site visits' (mostly held online due to Covid-19 travel restrictions) with presentations on regional initiatives, examples of best-practice projects and opportunities for peer-review discussions.



In addition, IRENES Knowledge Accelerators (IKA) were introduced in each region to guide interregional and local experience sharing and policy learning. These have involved activities such as capacity building workshops, job shadowing exchanges and role play simulations.

In the UK context it suggested a way of addressing a need arising from the trade-off and synergies analysis where stakeholders wanted better tools to consider alternative land uses and benefits as part of the renewable energy generation planning process.

References

1. <https://www.gov.uk/government/statistics/regional-renewable-statistics>
2. <https://hydrogeneast.uk/>
3. For example <https://newanglia.co.uk/economic-strategy/>
4. For example <https://www.essex.gov.uk/climate-action>
5. For example <https://www.cambridgeshire.gov.uk/residents/climate-change-energy-and-environment/climate-change-and-environment-strategy>
6. For example <https://www.greensuffolk.org/about/suffolk-climate-change-partnership/>
7. *RE100 in Practice – Environmentally Compatible Energy Transition*, <https://www.natur-und-erneuerbare.de/en/project-database/re100-in-practice-environmentally-compatible-energy-transition/>
8. Thiele J *et al.* (2021) 100 % erneuerbare Energien in Deutschland. Kann der Energiebedarf 2050 im Einklang mit Mensch und Natur gedeckt werden?, *Natur und Landschaft* 96(11): 517–525. DOI: 10.19217/NuL2021-11-02.



PART II – POLICY CONTEXT

- The Action Plan aims to impact:
- Investment for Growth and Jobs programme
 - European Territorial Cooperation programme
 - Other regional development policy instrument

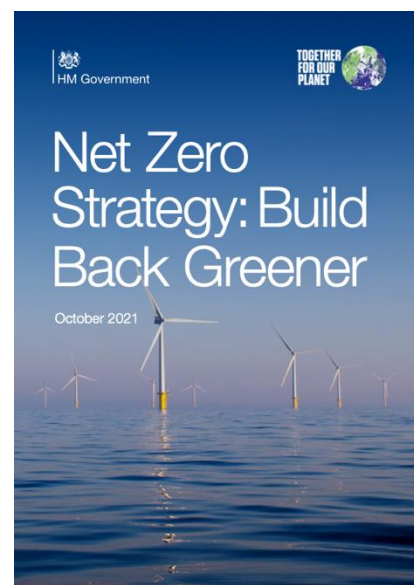
Name of the policy instrument(s) addressed:

HM Government (2021) *Net Zero Strategy: Build Back Greener*⁹.

The other IRENES project partners, as countries remaining in the European Union, have chosen their policy instruments from the relevant 2014-20 ERDF Operational Programme in order to influence and create policy change in subsequent programmes. Since the UK is no longer part of the EU, we cannot choose an ERDF Operational Programme to influence and demonstrate impact. Therefore, the UK Net Zero Strategy (hereafter NZS) has been chosen as the focus because it is the key current policy that shapes the decarbonisation agenda at national, regional, and local levels. Our particular concern is to expand the scope of platforms such as Net Zero Go (NZG) developed by the Energy Systems Catapult¹⁰ so that they better incorporate land use considerations and enable local authorities to plan for an environmentally compatible energy transition.

Further details on the policy context and the way the action plan should contribute to improve the policy instruments:

The UK component of the IRENES project was originally predicated on part of the Industrial Strategy published in 2017 which had four 'Grand Challenges'. One of these was 'Clean Growth' for which a strategy was also published in 2017¹¹. This was the original policy instrument to which the IRENES project in the UK was aligned. Since then, however, the policy landscape has evolved with a series of strategies. The Energy White Paper (2020) *Powering our Net Zero Future*¹², the *Net Zero Strategy: Build Back Greener* (2021)⁹ and the Levelling Up White Paper (2022)¹³ all place renewable energy generation and the green economy at the heart of national priorities to achieve decarbonisation and regional economic development.



At the same time, the 25 Year Environment Plan (2018)¹⁴ and Environment Act (2021)¹⁵ have set ambitious objectives to improve environmental quality and embed considerations regarding natural capital into wider decision-making.



However, while renewable energy generation can have many different trade-offs and synergies with other aspects of natural capital, this interface is only weakly recognised in current policy instruments.

The NZS⁹ proposes that the UK power system should be completely decarbonised by 2035 (p.19) and that this should include a sustained increase in the deployment of land-based renewables (p.103). There are also targets to treble existing woodland creation rates (p.26) and it is recognised that “delivering net zero creates opportunities to benefit other environmental objectives too” (p.173). If this is to be achieved it is also acknowledged that “Land use change must be designed in a systemic, geographically targeted way with appropriate local governance and delivery structures which consider the complex range of interacting social, economic, and demographic factors” (p.174). However, **more specific guidance on how this should be done, as well as relevant tools for regional and local stakeholders are currently lacking**. These points are highlighted by the Committee on Climate Change (an independent, statutory advisory body to the government) in their review of the NZS¹⁶. For instance, they emphasise **the need for greater support for local government** (pp.18-19) and **for a combined agriculture and land use strategy** (p.30). These points were also highlighted by the Chair of the Committee on Climate Change in his keynote presentation at the UK IRENES International Conference on 28th September 2021¹⁷. Issues regarding the intersection between renewable energy deployment to meet Net Zero Strategy targets and other possible uses of land also featured in several other conference presentations and associated discussion. **It is therefore these aspects of the NZS that this Action Plan is particularly focused upon.**

References

9. <https://www.gov.uk/government/publications/net-zero-strategy>
10. <https://es.catapult.org.uk/tools-and-labs/our-place-based-net-zero-toolkit/net-zero-go/>
11. <https://www.gov.uk/government/publications/clean-growth-strategy>
12. <https://www.gov.uk/government/publications/energy-white-paper-powering-our-net-zero-future>
13. <https://www.gov.uk/government/publications/levelling-up-the-united-kingdom>
14. <https://www.gov.uk/government/publications/25-year-environment-plan>
15. <https://www.legislation.gov.uk/ukpga/2021/30/contents/enacted>
16. <https://www.theccc.org.uk/publication/independent-assessment-the-uks-net-zero-strategy/>
17. For full video see <https://www.youtube.com/watch?v=jgZ1fuJmdNQ&t=29s>



PART III – DETAILS OF THE ACTION ENVISAGED

ACTION: Creation of the IRENES Land Use Tool to improve NZS decision making and planning processes.

1. Relevance to the project

In recent months the IRENES UK team have concentrated effort on analysing and understanding how different land uses and natural capital benefits support or conflict with options to develop renewable energy generation sources. **Our IRENES GIS analysis and maps have highlighted that many areas of high renewable energy generation potential also contain important natural assets.** Sub-region decision makers such as County Councils have valued these insights from IRENES and have started to incorporate them in policies and programmes to address Net Zero and Levelling-Up objectives. **The focus of our Action Plan is therefore to reinforce the existing Net Zero Go (NZG) platform with the IRENES results (from the SOTA and TO&S analyses) made available through the *IRENES Land Use Tool* - in order to improve the decision-making process and planning of the NZS related investments and projects.**

The Net Zero Go (NZG) has been developed as a free, easy-to-use platform bringing together tools and support that local authorities need to develop successful projects to meet NZS objectives. It is endorsed by BEIS (the government department for Business, Energy and Industrial Strategy which has lead responsibility for the NZS). However, none of these Energy Systems Catapult (ESC)¹ tools consider land use, natural habitats, or associated ecosystem services and benefits (e.g. biodiversity, landscape aesthetics), or the extent to which these assets might have trade-offs or synergies with future expansion of renewables. **This limitation has been recognised by ESC staff in discussions that UK IRENES team members have had with them.** Providing additional intelligence from the IRENES SOTA and TO&S analyses to complement the NZG tools will offer local authorities greater synergistic understanding, and, crucially, a more holistic perspective on how different land use, assets and values can be incorporated into decision making and planning.

¹ All UK local authorities (such as county councils and unitary authorities) have had offered to them a paid-for service to assess the current state of local energy use and generation potential through the production of a Local Energy Asset Representation (LEAR) report provided by the Energy Systems Catapult (ESC). The ESC is an independent, not-for-profit centre of excellence that bridges the gap between industry, government, academia, and research¹⁸. They take a whole systems view of the energy sector, helping to identify and address innovation priorities and market barriers, to decarbonise the energy system at the lowest cost. Quite often a council will secure external funding, usually from government, to pay for the LEAR service and frequently this is the first whole area assessment a council will have available to better understand their baseline position. The ESC will then offer a Local Area Energy Plan (LAEP) assessment which is in greater depth but is also a paid-for service. Five LEARs have been created in the East of England to date, with three County Councils considering LAEP assessments. The LEAR reports follow a standard structure which typically includes consideration of existing building stock, energy demands, electricity network capacity, renewables-based generation, electrical vehicle charging and socio-economic characteristics.



This action will enable local authorities in the East of England to fully understand the aspects of land use which currently receive little attention in the NZS (i.e. policy instrument) and need to be considered within a holistic decision-making process. It will also create a legacy from the IRENES project, contributing to longer term change so that the spatial data layers, analysis and delivery stakeholder network can be maintained and evolved for holistic energy infrastructure planning.

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References

18. <https://es.catapult.org.uk/>

2. Nature of the action - IRENES Land Use Tool

The UK IRENES Knowledge Accelerator (IKA) Members, which includes the county councils, have endorsed the concept of creating an IRENES Land Use Tool that will be based on the GIS data and maps from the SOTA and TO&S analyses and be available to local authority stakeholders via the **ESC NZG platform**. Initially, these resources will be available as a set of data layers and maps with the aim of embedding them in a software tool with query and other analytical capabilities over time.

The NZS does not offer guidance or criteria regarding land use considerations in meeting local decarbonisation targets. The IRENES Land Use Tool will provide the GIS data and analytical capabilities to fill this gap, allowing local government stakeholders to better assess options, land use trade-offs and synergies when evaluating renewable energy options in their areas - **significantly improving the decision making and planning process within the NZS**. This, in turn, will increase opportunities to achieve win-win outcomes or help ensure that other detrimental environmental impacts are avoided.



The action will involve the following three steps to achieve a more holistic perspective and ultimately enhance the implementation of the policy instrument:

1. **INTEGRATION & USE** - Enable the recently launched ESC Net Zero Go web platform¹⁹ to promote the data and findings from the IRENES SOTA and TO&S analyses and signpost local authorities and communities to these resources.
 - a. Secure approval from the Energy Systems Catapult (ESC) to link IRENES resources so that all local authority and community stakeholders in the region have access to existing IRENES SOTA and TO&S data and analyses.
 - b. Monitor use by stakeholders and establish a 360-degree feedback system so that, if necessary, operating arrangements can be evolved.
2. **IMPARTIALITY & SUPPORT** - Work with BEIS (the Government Department for Business, Energy and Industrial Strategy, with lead responsibility for the NZS), the Greater South East Net Zero Hub¹⁹ (GSNZH, the regional implementation arm) and the county stakeholders to develop the IRENES Land Use Tool and to set up its integration with the NZG platform
 - a. Work with stakeholders to scope the content and functions of the IRENES Land Use Tool (based on data and analyses from the existing SOTA and TO&S work) that will help users incorporate land use considerations in the various stages of project planning related to NZS objectives.
 - b. Create an operational IRENES Land Use Tool, with the extent of capabilities dependent on external funding bids. This would ideally package existing data and analyses with additional information (e.g. on electricity network capacity) and GIS analytical tools for option appraisal. Integration of the IRENES Land Use Tool into the Net Zero Go platform.
 - c. Approvals to be secured from the ESC and local authority stakeholders.
3. **PERMANENCE & EXPANSION** - Develop a viable business/financial model that will enable the IRENES Land Use Tool to continue (and be further developed) beyond the IRENES monitoring period.
 - a. Secure funding from a range of users, stakeholders, and partners.
 - b. Extend the concept of the IRENES Land Use Tool to the other four Net Zero Hubs in England once proof of concept, and advantages for NZS implementation (i.e. improvement of the policy instrument) have been demonstrated.

References

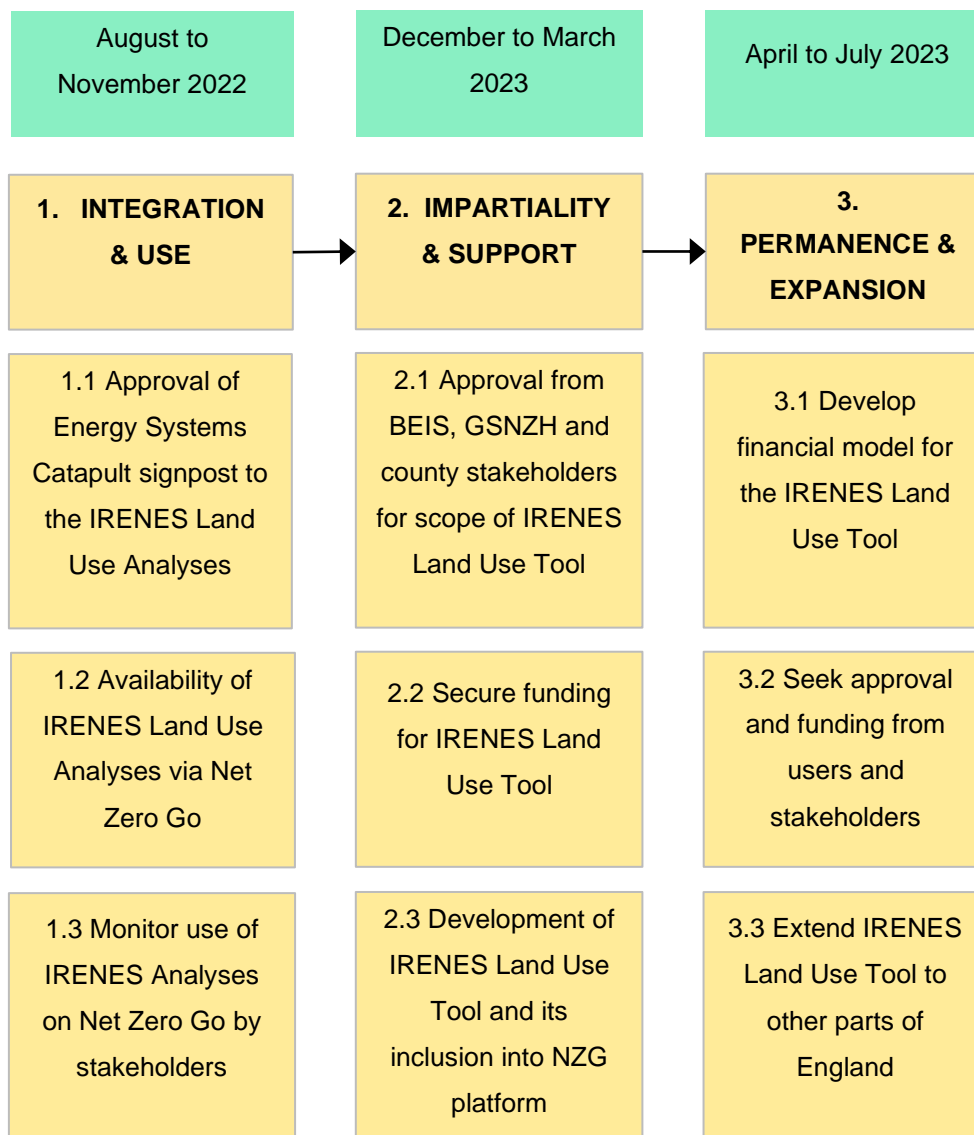
19. <https://www.gsenetzerohub.org.uk/>



3. Stakeholders involved in the implementation of the action.

- Each of the county councils in the East of England will be involved to tailor provision to their local requirements to meet Net Zero Strategy decarbonisation objectives.
- The Greater South East Net Zero Hub (an extension of the UK government department for Business, Energy and Industrial Strategy responsible for NZS).
- The Energy Systems Catapult responsible for creation and management of the Net Zero Go platform.
- The University of East Anglia (IRENES research partner).
- Anglia Ruskin University (IRENES implementation partner).

4. Timeframe





5. Costs

The creation of the tool is to facilitate the integration of IRENES land use data and analyses into the Net Zero Go platform. This ensures that the ability to undertake relevant GIS analysis is available to meet what local authorities and communities need to fully consider land use when making renewable energy deployment decisions. The scope and sophistication of the IRENES Land Use Tool is contingent on funding applications and/or match funding from a range of strategically and operationally interested parties.

Estimated annual costs for the IRENES Land Use Tool

- Online Stakeholder GIS portal with raw data and analysis warehousing €25,000.
- Part time UK IRENES Team GIS Analyst (95 working days per year) €30,000.
- Supervision of GIS Analyst €9,000.
- Project Co-ordinator and stakeholder liaison €18,000.
- **TOTAL €82,000.**
- Optional: PhD Studentship to develop further analytical functions (for 3 years in total) €24,000.

6. Funding sources

It is not expected that the action will be directed funded through the policy instrument. Instead, it will be financed by a mixture of some or all of the following:

- i. Government department(s) responsible for the NZS either directly or indirectly through a pre-existing innovation funding stream and/or their Net Zero Hub(s).
 - STATUS – The Greater South East Net Zero Hub Board has now approved phase 1 funding (€23,000) to pilot the IRENES Land Use Tool in the five county council areas the IRENES project covers. Subject to demonstration of impact further funding may be available.
- ii. Local authority stakeholders who implement the Net Zero Strategy objectives within their territories.
 - STATUS – Each of the five county council stakeholders are being engaged individually in order to encourage investment in the IRENES Land Use Tool.
- iii. IRENES project delivery partners.
 - STATUS – ARU and the UEA will match and/or contribute their time and resources to ensure any gaps in funding from funding components i. and ii. so that the IRENES Land Use Tool is delivered in the five-county area.



PART IV – MONITORING

The component activities of the Action Plan will be monitored in the line with the three main implementation steps. Six performance indicators will be used to demonstrate successful implementation and influence on the policy instrument (the NZS). These will include:

1. Agreement with the Energy Systems Catapult that the IRENES land use analyses can be sign posted from the Net Zero Go platform for local authorities and communities in the East of England.
2. Number of regional stakeholders accessing the IRENES resources via the Net Zero Go platform.
3. Scoping of IRENES Land Use Tool content and functionality with stakeholders.
4. Submission of funding applications to create the IRENES Land Use Tool.
5. Submission of funding applications for post-monitoring phase development of the tool.
6. Renewables projects whose development and planning has utilised county-based analyses or the IRENES Land Use Tool to inform, enhance and ensure environmentally compatible contribution to energy transition.



PART V - ENDORSEMENT

Date: 15 June 2022

All of the following organisations except the Energy Systems Catapult and the Great South East Net Zero Hub are IRENES UK IKA Members. They have been involved in reviewing delivery of the project periodically and have been active in supporting the discovery journey and identification of needs contained within this Action Plan.

The Energy Systems Catapult and the Great South East Net Zero Hub are being also asked to endorse the Action Plan because of their involvement in Net Zero Go.

Names of the organisations:

- Cambridgeshire County Council
- Community Energy England
- East Hertfordshire & Stevenage District Councils
- East of England Energy Group
- Energy Systems Catapult/Net Zero Go
- Essex County Council
- Greater South East Net Zero Hub
- National Grid Gas Transmission
- Norfolk County Council
- Suffolk County Council
- UK Power Networks
- UK Government Department for Business, Energy and Industrial Strategy

Signatures of the organisations:

To be added once the Action Plan has been approved by Interreg Europe.