EnergyCo

NSW GOVERNMENT

Transmission route selection

New England Renewable Energy Zone

July 2024

EnergyCo is leading the delivery of the New England REZ network infrastructure project to connect new renewable energy generation and storage in the REZ to the existing electricity network. The first two stages of the project are scheduled for completion by 2033 to ensure energy security across NSW as our coal-fired power stations retire.

Developing the transmission study corridor

EnergyCo is following a comprehensive process to develop a corridor for the New England REZ network infrastructure project based on community and stakeholder consultation, field investigations and environmental and technical assessments.

Our process for developing the study corridor aligns with the Department of Planning, Housing and Infrastructure's draft Transmission Guideline published in November 2023. The guideline is available to view at planningportal.nsw.gov.au/draftplans/under-consideration/draft-energy-policy-framework.

We will continue to assess and refine the corridor throughout 2024 and 2025 as we develop the project's Environmental Impact Statement (EIS). The EIS will include a narrowed corridor of about 250m wide, in which the final transmission easements will be located.

The final transmission line easements will be around 70m wide for a 500kV double circuit steel tower transmission line, and 60m wide for a 330kV double circuit steel tower transmission line.

Existing 330kV transmission line near Muswellbrook

In some sections there will be two transmission lines running parallel which will require a wider easement of up to 140m wide.

This fact sheet outlines the work we've carried out to develop the study corridor and the next steps for finalising the transmission route.

Existing dual 330kV transmission lines near Tamworth

What are our planning principles?

EnergyCo is assessing route options and energy hub locations against five key planning pillars: people, environment, economic, strategic and technical. These are considered throughout the route selection process to ensure the final transmission route provides a balanced outcome across all five pillars.

Planning pillar	Planning principles
People Benefits and impacts on people's wellbeing, amenity and quality of life	• Minimise impacts on the visual amenity of residences and landscapes • Minimise impacts on residential areas and rural residences • Maximise opportunities to deliver community benefits
Environment Impacts to natural and cultural environments	• Minimise impacts on biodiversity values • Minimise impacts on cultural heritage values • Maximise the use of available industrial and mining land
Economic Cost and impacts on key industries	• Deliver energy infrastructure that is in the long-term financial interests of NSW energy consumers • Minimise impacts on high value agricultural land, including biophysical strategic agricultural land (BSAL) and critical industry cluster (CIC) land • Maximise the use of suitable public land
Strategic Consistency with the NSW Electricity Infrastructure Roadmap (the Roadmap)	• Deliver energy infrastructure that meets the objectives and timing requirements of the Roadmap • Maximise co-location with existing transmission infrastructure • Maximise co-location with existing and proposed energy projects
Technical Technical efficiency and reliability in meeting electricity demand	• Maintain energy security and reliability, ensuring resilience of the power system • Optimise electricity infrastructure and power system development over the long term

Key steps in the route selection process

1 Route design options

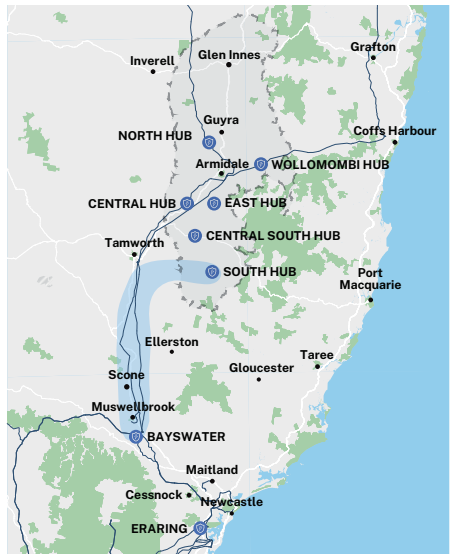
EnergyCo began considering route options for the New England REZ network infrastructure project in 2022. The first step involved developing a long list of potential options which were identified and evaluated based on land use planning, community, environmental and technical constraints and opportunities. This process was informed by wind and solar resource mapping, as well as generator data collected through a registration of interest process, which allowed EnergyCo to identify key areas for generation development in the New England REZ.

We then reviewed the feasibility of viable options to establish a shortlist of six potential routes (bulk corridors) to transfer electricity from the REZ to load centres in the south. This was done by assessing the long list of options against EnergyCo's five planning pillars. The shortlisting process was supported by targeted consultation with prospective generation and storage developers. The six bulk corridor options were subject to further detailed analysis and desktop assessment against EnergyCo's planning pillars (outlined on the next page).

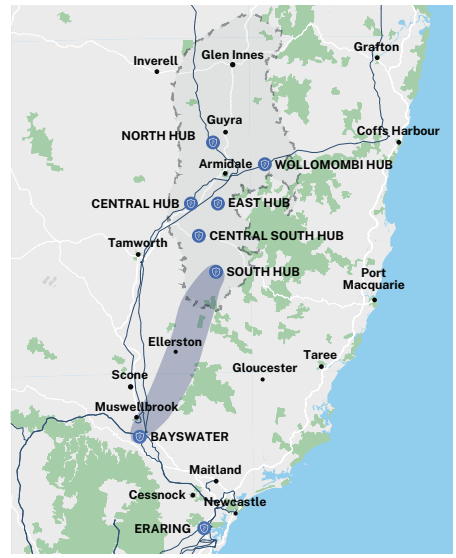
Initial route options for the bulk transmission corridor

Option A: Western (central)

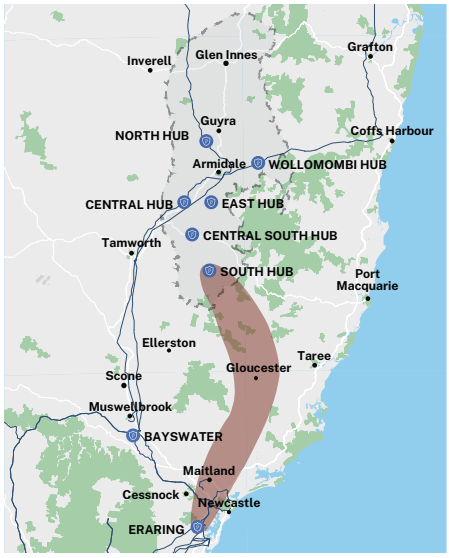
Option B: Western (south)



Option C: Mid-western

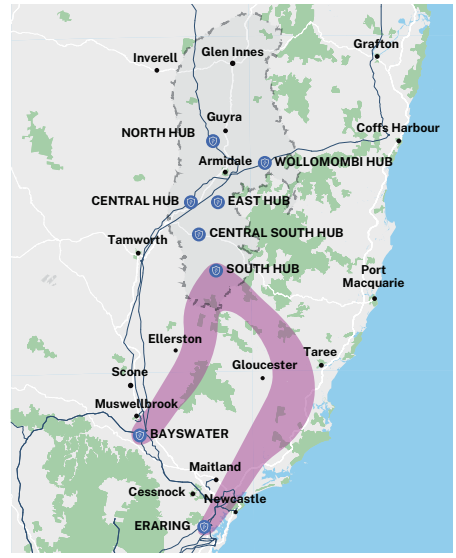


Option D: Eastern



Option E: Upgrading existing lines

Option F: Mid-western/eastern split



Maps are indicative only and represent initial route options assessed by EnergyCo. Energy hubs shown were considered as part of the initial option evaluation process and do not represent the final hub locations. For the latest map of the transmission study corridor, visit EnergyCo's interactive map at caportal.com.au/energyco/rez. The existing NSW high voltage network is shown in blue.

Bulk corridor options assessment

EnergyCo's key planning pillars	Option A: Western (central) *Construction of two new 500kV transmission lines from a potential central hub to the existing 330kV line near Tamworth. From there, two new 500kV transmission lines would extend south to Bayswater, running parallel with existing 330kV lines.*	Option B: Western (south) *Construction of two new 500kV lines from a potential south hub to the existing 330kV lines near Tamworth. From there, two new 500kV lines would extend south to Bayswater, running parallel with the existing 330kV lines.*	Option C: Mid-western *Construction of two new 500kV lines extending south from a potential south hub to Bayswater, passing to the west of the Barrington Tops National Park via Ellerston. This route partially aligns with existing 132kV lines.*	Option D: Eastern *Construction of two new 500kV lines extending from a potential south hub to Eraring via Gloucester.*	Option E: Upgrading existing lines *Upgrading three existing 330kV transmission lines to 500kV.**	Option F: Mid-western/eastern split *A hybrid of the mid-western and eastern options, involving the construction of a single 500kV transmission line along both of these routes.*
People	Lower impact to built up areas and rural dwellings	Lower impact to built up areas and rural dwellings	Least impact to built up areas and rural dwellings	Greater impact to built up areas and rural dwellings	Greatest impact to built up areas and rural dwellings	Greatest impact to built up areas and rural dwellings
Environment	No impact to National Parks estate, old growth protected areas, important wetlands or important rainforest	No impact to National Parks estate, old growth protected areas, important wetlands or important rainforest	No impact to National Parks estate, old growth protected areas, important wetlands or important rainforest	Impacts state conservation area and old growth protected area. Greater impact to mapped core koala habitat, important wetlands and rainforest	Impacts Gondwana Rainforests of Australia World Heritage Area. Impacts National Parks estate and requires more native vegetation clearing	Impacts state conservation area, old growth protected areas and has greater impacts to mapped core koala habitat, important wetlands and rainforest
Economic	Shorter line length. Impacts critical industry cluster and cropping land	Shorter line length. Impacts critical industry cluster and cropping land	Shorter line length. Impacts critical industry cluster land	Greater line length. No impacts to critical industry cluster or cropping land	Longest line length. Impacts critical industry cluster and cropping land	Greater line length. Impacts critical industry cluster but no impacts to cropping land
Strategy	Significant co-location with existing transmission lines	Significant co-location with existing transmission lines	Reduced opportunities to co-locate with existing transmission lines	Reduced opportunities to co-locate with existing transmission lines	Maximises co-location with existing transmission lines. Multiple routes provide increased network security	Reduced opportunities for co-location, however multiple routes provide increased network security
Technical	Reduced slope and flooding constraints	Reduced slope and flooding constraints	Reduced slope and flooding constraints	Reduced slope and flooding constraints	Greatest slope and flooding constraints	Greater slope and flooding constraints

Legend

Light blue = Preferable outcome relative to other options
White = Less preferable outcome relative to other options

** The upgraded lines would extend east from a potential Wollomombi hub to Kempsey and then south via Port Macquarie, Taree and Gloucester to Eraring; south from the potential south hub to Bayswater, via Ellerston; and south from a potential central hub to Bayswater via Tamworth.*

2 Option feasibility

Following assessment of the six route design options, upgrading existing lines (Option E) and the mid-western/eastern split (Option F) were excluded from further consideration because they had significantly longer line lengths and would have greater community impacts.

An option feasibility assessment was then carried out on the four remaining bulk corridor options. This built on the findings of the initial assessment and was supported by newly available information and desktop analysis including preliminary design, consideration of key land use planning, environmental and technical constraints and initial assessment of costs. Site visits and surveys from publicly accessible areas were carried out to inform the assessment.

An expressions of interest process was also carried out to obtain further detail on potential generation and storage developments within the REZ.

While each of the four shortlisted bulk corridor options were found to be feasible, they had varying constraints in terms of constructability, community, environmental and other factors.

The potential energy hub at Wollomombi was excluded from further consideration at this time based on limited generator interest. Five remaining hub locations were retained for further evaluation: north, east, south, central, and central south.

3 Option evaluation

A detailed option evaluation was carried out to select a route option and energy hub model from the four shortlisted bulk corridor options (Options A to D). At this stage, the two western options (Options A and B) were combined into a single western bulk corridor option.

The three remaining bulk corridor options (western, mid-western and eastern) were subject to an option evaluation process which included a range of detailed environmental and technical assessments.

This included:

- environmental planning studies involving desktop assessment against EnergyCo's planning pillars and principles
- constructability, geotechnical, property and traffic assessments and comparative risk assessments using Geographic Information System (GIS) analysis
- power systems analysis and updated generator data from the expressions of interest process
- transmission line assessment which considered potential risks such as bushfire and lightning
- energy hubs assessment and indicative design inputs.

Based on the higher environmental and community impacts as well as time and cost risks associated with the eastern corridor (Option D), this option was excluded. The western (Options A and B) and mid-western (Option C) corridors were selected for further evaluation. Further detailed analysis concluded the western bulk corridor was preferred over the mid-western bulk corridor when considering EnergyCo's planning pillars (summary provided on the next page). The option evaluation process also concluded that a five energy hub model would be carried forward for further consideration.

Why can't existing transmission lines be upgraded?

The existing 330 kilovolt (kV) transmission lines that currently transfer power between Bayswater, Tamworth and Armidale, and between Armidale, Kempsey and Newcastle, are operated by Transgrid. They currently operate at near full capacity. We considered if the existing lines could be upgraded to meet the capacity requirements for the REZ, however this option was excluded early in the evaluation process due to a number of constraints.

Upgrading the existing network would require lengthy system outages during construction which would have a major impact on the operation of the National Electricity Market (NEM). The existing lines would need to be taken down, easements widened and two new towers would need to be built. This option has a significantly longer line length than other options considered, therefore increasing time, cost and constructability constraints. It also interacts with a larger number of communities as the existing lines are close to regional centres which have experienced major growth since the lines were first built. For these reasons, upgrading the existing lines was not a preferred option for the New England REZ.

Option evaluation summary: Western and mid-western bulk corridor

Planning pillar	Western corridor	Mid-western corridor
People	Closer to built up areas and more dwellings in proximity to the bulk corridor. However, visual sensitivity is likely to be lower where transmission lines can be co-located with existing infrastructure	Avoids built up areas and impacts fewer dwellings. However, as the route is mostly located on undisturbed 'greenfield' land, visual sensitivity is likely to be higher
Environment	Reduced impacts to native vegetation as the bulk corridor is generally more cleared with scattered patches of vegetation. Greater bushfire resilience	Increased impacts to native vegetation (including intact remnant vegetation) and involves more watercourse crossings. Reduced bushfire resilience
Economics	Lower estimated cost and shorter construction period. The corridor utilises Water NSW land around Lake Glenbawn	Higher estimated cost and longer construction period
Strategy	Enables more cost effective and timely delivery and maximises opportunities for co-location with existing transmission infrastructure and projects	Increases cost and time risks and provides reduced opportunities for co-location with existing transmission infrastructure
Technical	Improved constructability outcomes due to less rough terrain. The route is more accessible via state highways and regional roads and provides better access to emergency services and workforce accommodation	Reduced constructability outcomes and access challenges due to the remoteness of the route and roughness of the terrain. Access would rely more heavily on the use of minor roads. Reduced access to emergency services and workforce accommodation

Why can't the transmission lines go underground?

EnergyCo is proposing overhead transmission lines for the REZ network infrastructure project as they have shorter construction timeframes, a smaller environmental footprint, lower costs and fewer constructability constraints than underground infrastructure.

Limitations of underground transmission lines include:

- physical constraints when traversing steep terrain such as ravines and escarpments
- extensive trenching and earthworks, representing a significantly higher impact across a larger footprint than overhead lines, which may not be suitable in certain geology and areas of high biodiversity or cultural value
- restrictions on vegetation growth over the entire easement, meaning agricultural cropping may not be permitted within the easement
- the construction timeframe is substantially longer compared to the overhead equivalent, which extends construction amenity impacts and reduces benefits to energy consumers under the NSW Electricity Infrastructure Roadmap
- fault-finding and repair for underground systems is more challenging and time consuming than for overhead systems, requiring substantial excavation. This can result in prolonged outages and interruptions to power supply.

The limitations of undergrounding have been addressed in the recent Standing Committee on State Development Inquiry on the Feasibility of undergrounding the transmission infrastructure for renewable energy projects (Parliament NSW, 2023), as well as the following Select Committee on State Development Inquiry on the same topic. You can read more by searching 'undergrounding' at parliament.nsw.gov.au.

Table legend: Light blue cells = Preferable outcome relative to other options. White cells = Less preferable outcome relative to other options.

4 Preliminary study corridor

Based on the findings of the options evaluation, a 1km wide preliminary study corridor was identified which generally followed the alignment of the western bulk corridor option. The preliminary study corridor included indicative locations for five energy hubs: central, central south, north, east and south.

The preliminary study corridor was then subject to community and stakeholder consultation from May 2023, as well as further generator engagement, technical studies, modelling of costs and benefits and other detailed assessments.

Key benefits of the preliminary study corridor relative to other options include:

- Opportunities to minimise interactions with towns/settlements and use topography to **minimise visual impacts**
- Significantly improved **constructability outcomes** from less rough terrain
- Greater ability to mitigate and manage **bushfire risks**
- Greater opportunity to use 330kV infrastructure in the REZ and **minimise the extent** of 500kV infrastructure needed on the New England plateau
- Greater opportunities to **co-locate with existing** transmission lines and generation infrastructure along sections of the route
- Improved **accessibility** due to existing road networks
- Greater **flexibility** for hub connection options
- **Lower costs and faster** delivery timeframes, supporting the delivery of energy affordability and reliability objectives
- **Reduced interactions** with biophysical strategic agricultural land (BSAL) and critical industry cluster (CIC) land
- **Fewer predicted impacts** on listed threatened species and communities
- **Reduced impacts** to protected areas and conservation areas
- Greater **opportunities** to use public land

5 Revised study corridor

A revised study corridor (1km wide) was announced in March 2024 which incorporated a number of changes and refinements in response to community and stakeholder consultation and further technical studies.

The changes resulted in about 80 fewer landholders in the study corridor and a reduction in transmission easements of around 39km.

It also increased the use of public land and avoided impacts to smaller landholdings. The number of proposed energy hubs in stage one and two reduced from five to four with the deferral of the south hub, announced in January 2024.

6 Preferred study corridor

The revised study corridor forms the basis for the preferred study corridor released in July 2024 as part of the scoping report for the REZ network infrastructure project. The preferred study corridor is generally 1km wide along most of the proposed transmission route, but incorporates some narrower sections where co-location with existing transmission lines is proposed. The corridor narrows to about 600m wide through these areas.

The preferred study corridor will be subject to further assessment and refinement as a result of ongoing consultation and field investigations.

7 Environmental impact statement (EIS) project design

The preferred study corridor will continue to be assessed and refined in response to community and stakeholder feedback and the findings of technical assessments, including the environmental and social studies that will be completed as part of the EIS.

Through this refinement process, the project design will be developed and presented in the EIS which will be about 250m wide for the transmission lines. This alignment will form the basis of EnergyCo's planning approval application for the REZ network infrastructure project. Development of the EIS began in 2023 and will continue through 2025.

Next steps

EnergyCo will continue to consult with communities and stakeholders and carry out detailed assessments to inform the final transmission route.

We will keep the community informed as the project progresses and welcome ongoing feedback to inform our planning.

How to view the corridor in more detail

Visit EnergyCo's interactive map at caportal.com.au/energyco/rez to view the preferred study corridor. You can also find maps of the corridor by reading the scoping report via our website at energyco.nsw.gov.au/ne.

The interactive map includes key features of the New England REZ such as the transmission study corridor, proposed energy hub locations, existing high voltage network and land boundaries.

Scan the QR code to view the interactive map.

Uralla


Armidale

Contact us

EnergyCo wants to hear what you think about our plans. If you have questions or want to give feedback, please get in touch with our team.

nerez@energyco.nsw.gov.au

1800 061 114 (9am to 5pm, Monday to Friday)

energyco.nsw.gov.au/ne

Scan the QR code for more information.

If you need help understanding this information, please contact the Translating and Interpreting Service on **131 450** and ask them to call us on **1800 061 114**.