



# Call for Tender: Front-end developers and data interface designers

<b>Title</b>	Web design and development services for the ForestNavigator project
<b>Deadline</b>	June 14 <sup>th</sup> , 2024
<b>Project</b>	<a href="#">ForestNavigator</a> (funded by the Horizon Europe scheme of the European Commission)
<b>Contract type</b>	Subcontract
<b>Period</b>	July 2024 - September 2026
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1. Introduction to the ForestNavigator Project and the Portal.....	2
1.1. About the Project.....	2
1.2. About the Forest Data and the Forest Pathway Explorers.....	3
2. Activities and Deliverables for the Portal .....	3
2.1. Overview of Activities.....	3
2.2. Main Deliverables .....	4
3. Data and Functionality Requirements of the Web Explorers.....	6
3.1. Data to be hosted in the Web Explorers.....	6
3.1.1. Forest Data Explorer.....	6
3.1.2 Forest Pathways Explorer.....	7
3.2. Functionalities required for the Web Explorers.....	7
3.2.1. Forest Data Explorer.....	7
3.2.2. Forest Pathways Explorer.....	8
4. Modalities of work and collaboration.....	9
4.1 Open Access philosophy .....	9
4.2 Sharing of responsibilities in the consortium .....	10

4.3 Technical duties of the subcontractors .....	10
4.4 Further technical requirements.....	11
5. Tender Submission Process.....	11
Annex.....	13

# 1. Introduction to the ForestNavigator Project and the Portal

## 1.1. About the Project

The ForestNavigator project assesses the potential contribution of forests and forest-based sectors in the European Union to the achievement of its objective to become climate neutral by mid-century. It does so by modelling robust policy pathways, aligned with its medium (2030) and long-term (2050) climate goals, and whose underlying narratives have been co-developed with stakeholders from the broad forestry sector, including decision makers at the EU and country level. The implications of these pathways for the climate mitigation potential of forests are being quantified, as well as other environmental and socio-economic objectives. The project relies on the coupling of complementary modelling frameworks with high-resolution data on the status of forests (i.e. type, health, carbon sequestration potential) and the influence of forest management practices on key environmental and socio-economic variables.

ForestNavigator aims to provide information for the European Union in its entirety. It also zooms into selected EU Member States by providing national pathways consistently across the EU and out towards the global scale to account for extra-EU future drivers and potential leakage effects.

To maximise its policy relevance, ForestNavigator is developing a decision-making platform called the **ForestNavigator Portal, comprising of two web tools referred to as the Forest Data Explorer and the Forest Pathway Explorer (also referred to as Web Explorers)**. These tools will visualize datasets and alternative pathways to help achieve forest sector targets.

Please visit the [project's website](#) for detailed project information, its purpose, target users/audience and deliverables.

## 1.2. About the Forest Data and the Forest Pathway Explorers

The Forest Data Explorer will allow for visualisation of geospatial data, e.g. on the status of forests (type, health, carbon sequestration potential...), influence of forest management practices on key environmental and socio-economic variables and spatial explicit results of forward-looking scenarios. The Forest Pathway Explorer will provide a platform to visualise the results of the pathway modelling activities conducted as part of the ForestNavigator project (climate mitigation potential, socioeconomic and environmental synergies and trade-offs). The two webtools will be closely linked and could eventually be designed as a single platform. The webtools are intended to disseminate the results of the project to its stakeholders (i.e. users), which constitute an arguably diverse group: policymakers at the EU and national levels, forest managers, business and industry, civil society, general public, as well as researchers.

An Application Programming Interface (API) programmed and hosted on IIASA's IT infrastructure will serve as a bridge between the project database (also hosted by IIASA) and the Web Explorers, by managing communication and data exchange as well as basic processing tasks.

More information on the data and functionalities to be added to the Explorers can be found in Section 3 below.

## 2. Activities and Deliverables for the Portal

### 2.1. Overview of Activities

The recruited expert(s) will be centrally contributing to the development of the ForestNavigator Portal's Web Explorers and specifically responsible for **designing and developing the front-end component of the portal**. They will also collaborate with Climate Analytics' and IIASA staff members to contribute to the development of the back-end component. As such, they will be in charge of:

- Designing **interactive visualisations allowing online exploration of the scientific data developed as part of the ForestNavigator project**. The visualisations should achieve the following goals:

- Present the key concepts of the ForestNavigator project in an understandable way for various identified target groups (e.g. policy makers, forest managers, forestry science experts);
- Convey the key scientific findings and the added value coming out of the data developed as part of the project;
- Setting up the web-based infrastructure that will display the designed interactive visualisations, as well as provide access to the underlying data.

This work will rely on a close collaboration with scientists from the ForestNavigator consortium and especially from Climate Analytics and IIASA, who will coordinate the Portal development.

The recruited expert(s) will regularly attend progress meetings with consortium scientists to co-conceptualise the Portal and exchange feedback on intermediary versions. They will then be in charge of addressing feedback from ForestNavigator scientists as well as future users of the Portal (ForestNavigator stakeholders) to improve its usability and understandability.

## 2.2. Main Deliverables

The deliverables under this tender are tied to the project deliverables of the ForestNavigator project and need to be strictly observed. Main deliverables are described and require interim delivery to gather feedback from project partners in advance of the deadlines described. Partial invoicing is possible for main deliverables, but full imbursement only follows the submission of final deliverables.

### 1. **First design suggestions of the Web Explorers** - September 2024

An intermediary mock-up of design suggestions should take the form of non-clickable wireframes to illustrate possible user journeys through the Data and Pathway Explorers. The first design suggestions are needed by start of September 2024 to collect initial feedback from a small target stakeholder group (September 16, 2024). As an indication, about 5 % of the total work is expected to be delivered in this first step.

### 2. **Beta version of the Data Explorer** - February 2025

A clickable web version of the Data Explorer should offer several of the functionalities envisioned for the final version and allow exploration of some of the spatially explicit

datasets that will have been delivered by the project partners, depending also on their priority for target users (which partly remains to be determined). The beta version should clarify accessibility, effectiveness, efficiency, and functionalities to allow for further feedback from the consortium and stakeholder groups and possibly open to public use. It should be built in a way that allows easy integration of further spatially explicit datasets at a later stage. As an indication, about 20% of total work is expected to be delivered in this step.

3. **Beta version of the Pathways Explorer** - August 2025

A clickable web version of the Pathway Explorer should offer several of the functionalities envisioned for the final version and allow exploration of some of the pathway modelling results that will have been delivered by the project partners, depending also on their priority for target users (which partly remains to be determined). The beta version should clarify accessibility, effectiveness, efficiency, and functionalities to allow for further feedback and identification of any potential barriers to satisfaction from target audiences and possibly open to public use. It should be built in a way that allows easy integration of further pathway modelling output datasets at a later stage. As an indication, about 15% of total work is expected to be delivered in this step.

4. **Data Explorer public launch** - December 2025

At this stage, input from initial design and beta versions will have informed final Data Explorer designs to ensure an effective and efficient structure for intended functionalities. The final version of the Data Explorer should be fully functional with all clickable elements to publicly launch and promote the Data Explorer. As an indication, about 20% of total work is expected to be delivered in this step.

5. **Pathways Explorer public launch** - June 2026

At this stage, the final version of the Pathway Explorer will be built based on input and feedback from initial design concepts and its Beta version. A final fully functional tool should display all necessary visualizations, user guidance, and functionalities to ensure

effective and efficient structure. As an indication, about 25% of total work is expected to be delivered in this step.

## **6. Finalisation of the Pathways Explorer and Data Explorer - September 2026**

After the public launch of both web Explorers, a small amount of work is to be expected to fix remaining technical bugs, ensure smooth integration of the last datasets and/or implement slight adjustments based on user feedback. As an indication, about 15 % of the total work is expected to be delivered in this last step, also depending on the remaining budget.

## **3. Data and Functionality Requirements of the Web Explorers**

### **3.1. Data to be hosted in the Web Explorers**

#### **3.1.1. Forest Data Explorer**

The Forest Data Explorer will provide functionalities to visualize selected geospatial data products retrieved from the IIASA cloud repositories and implement workflows to retrieve tailored aggregated information.

One example dataset is the [multilayered forest geodatabase](#) at the service of monitoring and modelling carbon and biodiversity. The [report describing this dataset](#) is publicly available on the [ForestNavigator website](#). This dataset contains several data layers at a resolution varying between 100m and 1km, such as forest age, forest cover, disturbances, natural forests, etc. Several datasets of similar resolution, but also coarser-resolution data (for example at national level) shall eventually be integrated into the Forest Data Explorer. These will provide information for example on the status, health, and carbon sequestration potential under various forest management practices. The exact list of ForestNavigator datasets to be integrated will be refined and prioritised later in particular based on stakeholder preferences.

Some characteristics of those datasets are provided below as an indication (final characteristics may differ to adjust to the final technological solutions used for the tool development and to the overall project objectives):

- **Format of data sources:** Geotiff/netcdf (this last format will be preferred), .csv files.

- **Spatial resolution:** 5 arcminute (~10km) and finer (down to 100m) for unprocessed data, coarser resolutions for aggregated results (over countries, NUTS2 regions, watersheds or other geographies preferred by stakeholders).
- **Temporal resolution:** single time step, or monthly, yearly or 5-year resolution depending on the indicator.
- **Data Hosting:** Data repository at the IIASA cloud.

### 3.1.2 Forest Pathways Explorer

The Pathways Explorer will provide a platform to visualize data output (aggregated for example at the national/NUTS2 levels or more spatially explicit) especially on climate mitigation pathways and associated socioeconomic and environmental indicators (such as impact on carbon sequestration, biodiversity, employment in the forestry sector). The Explorer will let the users navigate through the pathways, obtaining documentation on the assumptions underlying each pathways, background information for each time step, and compare results across scenarios and models. The exact list of indicators and pathways to be visualised is in the process of being defined based on stakeholder preferences.

Some characteristics of those datasets are provided below as an indication (final characteristics may differ to adjust to the final technological solutions used for the tool development and to the overall project objectives):

- **Format of data sources:** Geotiff/netcdf, .csv files
- **Spatial resolution:** 5 arcminute (~10km), NUTS2, National, EU Regions, EU
- **Time:** Dynamic 5 years-time steps to 1 year.
- **Data Hosting:** data server in IIASA cloud based on GitLab technology and deployment for visualization through Kubernetes orchestrated Application Programming Interface (API).

## 3.2. Functionalities required for the Web Explorers

### 3.2.1. Forest Data Explorer

A preliminary list of the functionalities required for the Forest Data Explorer is included below:

- Operational web-based service for user friendly visualization of the indicators included in the geospatial datasets generated by the project.

- Maps selectable for various years, with possibility to display changes compared to a reference year/period.
- Visualization of time dynamics using time series plots.
- Customizable visualization of georeferenced data at different scales (national, NUTS2 levels, grid cell, watershed etc., depending on the indicator).
- Display of aggregated pre-calculated statistics associated with each 5arcmin/NUTS2/National border.
- Dashboard accessible online associated to the geospatial grid, summarizing key statistics for the spatial scale selected by the user (national, NUTS2, etc.).
- Comparison of options/years, for example via a split screen.
- Data download for web users from the IIASA back-end clouds.
- Secured data access (where needed).
- Extra pages featuring results for specific indicators and regions (stories) or providing information on the datasets and underlying methodologies.
- Links to the EU Pathways Explorer to be able to investigate projected changes in some indicators covered by the Data Explorer under various scenarios/pathways.

- **Formats of data download:** .csv, .tif, .nc files
- **Tool physical location:** The web tools will be accessible via the IIASA website.
- **Open Access philosophy:** the scripts will be made openly accessible for example via GitHub/GitLab and be cloned on the IIASA cloud.

### 3.2.2. Forest Pathways Explorer

A preliminary list of the functionalities required for the Forest Data Explorer is included below:

- Visualization of non-georeferenced data (pathways) including two dimensions (x-axis = time) and magnitude (y-axis = carbon sequestration, socioeconomic and environmental indicators)
- Customizable aggregation/split of forest sector mitigation categories included in the pathways (for example possibility to visualize separately the contribution of 'forest management' and 'afforestation' to 'forest mitigation' contribution).



- Filtering function to select and display relevant pathways and their components of interest for the user story boards describing the scenarios included in the pre-computed pathways and guiding the selection of pathways by the user visual comparison of different scenarios/pathways (split-screen function).
  - Dashboard accessible summarizing key characteristics of socioeconomic and environmental indicators associated to the pathways, for example using qualitative (e.g., traffic light) or quantitative (e.g., scores) assessments of how much the pathways focus on some key dimensions/policy priorities (e.g., bioeconomy, biodiversity conservation).
  - Possibility to build new pathways based on pre-computed ones by allowing to select different policy priorities in various regions and visualize the outcomes of these new combinations.
  - Graph and data download for web users from IIASA back-end clouds.
  - Links to the EU Data Explorer to be able to investigate the evolution of some key indicators covered by the EU Pathway Explorer.
  - Secured data access (where needed).
- **Formats of data download:** .csv files
  - **Tool physical location:** The web tools will be accessible via IIASA's website.
  - **Open Access philosophy:** the scripts will become open access for example via GitHub/GitLab and be cloned on the IIASA cloud.

## 4. Modalities of work and collaboration

### 4.1 Open Access philosophy

The work delivered by the subcontractors should be compliant with the FAIR principles put forward by the European Commission (funding the ForestNavigator project) and the overall philosophy of open science. The code of the end-products should therefore be made fully open source, allowing to re-use it as such but also to adjust parts of it for other purposes (software program consistent with the AGPL v3 and creative content consistent with CC-BY licenses).

## 4.2 Sharing of responsibilities in the consortium

Climate Analytics coordinates the overall development of the Explorers under the guidance of IIASA (project coordinator and contract manager). Climate Analytics will also perform the processing of the data to be visualized in the front-end, in coordination with the scientists generating the data. Climate Analytics will also advise the subcontractors about how to visualize the scientific messages extracted from the data and check the scientific accuracy of the resulting visualizations.

It is expected from the subcontractors that they attend regular progress meetings with consortium scientists to co-conceptualize the Portal and exchange feedback on intermediary versions.

IIASA will be hosting the data to be visualized and the API used by portal. They will eventually be responsible for maintaining the portal after their finalization. To that end, IIASA and Climate Analytics should be given continuous access to the source code in order to review it according to a schedule to be agreed on with the subcontractors.

## 4.3 Technical duties of the subcontractors

The subcontractors are asked to undertake the following activities and fulfil the following requirements:

- Design and develop frontend components and features for web applications using Vue.js or React.js frameworks.
- Utilize TypeScript to write clean and scalable code, ensuring robustness and maintainability.
- Lead the design of the entire layout and user interface of web applications, ensuring a seamless and visually appealing user experience.
- Integrate mapping functionalities using OpenLayers or Leaflet to visualize geospatial data within web applications.
- Implement chart and graph visualizations using libraries like D3.js, Chart.js, or Highcharts.
- Adhere to clean architecture principles to ensure modularity, maintainability, and scalability of frontend codebases.
- Optimize frontend performance and user experience through responsive design principles and performance optimizations.
- Conduct thorough testing and debugging of frontend code to ensure high reliability and stability.
- Implement SEO best practices to improve the discoverability and ranking of web applications on search engines.
- Familiarity with server-side rendering (SSR) techniques and frameworks like Next.js or Nuxt.js.
- Collaborate closely with design and backend teams to translate UI/UX designs into interactive and responsive web interfaces.
- Participate in code reviews, providing feedback to maintain code quality and adherence to best practices.

- Stay updated with the latest frontend development trends, technologies, and tools.
- Communicate effectively with project managers and team members to ensure project requirements are met within deadlines.

#### 4.4 Further technical requirements

It is also required from the subcontractor to fulfil the following requirements:

- Ability to design the entire layout and user interface of web applications.
- Strong proficiency in Vue.js and/or React.js frameworks.
- Experience with TypeScript for building scalable and type-safe frontend applications.
- Familiarity with mapping libraries such as OpenLayers or Leaflet for integrating geospatial functionalities.
- Knowledge of HTML5, CSS3, and modern JavaScript ES6+ syntax.
- Experience with responsive design principles and CSS frameworks like Tailwind CSS.
- Experience with chart and graph libraries such as D3.js, Chart.js, or Highcharts.
- Understanding of clean architecture principles and their application in front-end development.
- Experience implementing SEO best practices to improve web application visibility.
- Familiarity with server-side rendering (SSR) techniques and frameworks like Next.js or Nuxt.js.
- Strong problem-solving skills and attention to detail.
- Excellent communication and collaboration skills.

### 5. Tender Submission Process

**The final cut-off for submission is the June 14, 2024.**

This call for tender is issued on May 17, 2024. Bidders are asked to prepare a written submission demonstrating their ability to provide the services and tasks listed above. The submission should include, but is not limited to:

- A short description of the capacity of the company / individuals, CVs of the developer(s) and UI/UX designer(s).
- List of past relevant projects that demonstrate competence, ideally including the corresponding links and user groups addressed.

- Any professional experience working with forest/environment/climate data and/or research, forest, environmental, or climate science institutions.
- Experience with data communication, dashboard development, information portal design, and/or building web-based applications for data visualisation.
- Familiarity with communication, meeting, and documentation platforms used such as Slack, SharePoint, Zoom, and Teams.
- Brief elaboration of the services and tasks identified, and the anticipated approach, including the programming languages, software and tools to be used as well as the work distribution and processes amongst team members.
- Financial quote, preferable with a breakdown by deliverables as described in Section 2.2, communicated with an estimated number of days and daily rate. We estimate that a contracted amount around 80.000 EUR would allow to deliver the specified output. Nonetheless, this does not preclude submission and selection of a bidder requesting different amounts. The bidder should also state whether they are registered for VAT in the EU or not and provide their VAT number if so.

While bidders are required to include a comprehensive breakdown of all included services, features, and components, they are also asked to explicitly outline any relevant items, services or features that are NOT covered by the quote. This should encompass any potential exclusions such as additional customization, third-party integrations, ongoing maintenance, or support beyond the agreed-upon scope of work. The clarity provided in delineating what is not included is crucial for accurate budgeting and avoiding misunderstandings during project execution. Failure to specify exclusions may result in discrepancies in expectations and could lead to delays or additional costs. Therefore, bidders are strongly urged to be transparent in their proposals, ensuring a clear understanding of the full extent of the services offered and any limitations thereof.

The successful bidder will be selected by Climate Analytics and IIASA and contracted ideally before July 2024 in accordance with the timeline outlined in Section 2.2.

## **Annex**

Upon request, interested bidders can receive a compilation of graphs, maps, and other visualizations derived from an initial analysis of the multilayered forest geodatabase at the service of monitoring and modelling carbon and biodiversity listed in Section 3.1.1. However, due to the preliminary nature of these findings, they will be shared exclusively with bidders who provide a written agreement not to distribute them further.