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VALUE ESTIMATION OF DIGITIZING ENVIRONMENTAL ASSESSMENTS

Analysis of the potential of using cross-cutting and common digital tools and data in environmental assessment processes
(un-official AI assisted translation)

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Content

Introduction and Method

This document contains an analysis of the potential impact of establishing a solution for cross-cutting data support of environmental assessments in Denmark. The analysis is made in connection with the completion of the DREAMS project as a re-estimation of the value of the digital tools EA-hub and EA-tools, which have been developed in basic versions as part of DREAMS.

The document consists of two primary sections:

1. Analysis and value estimation itself
2. Detailed description of the solution and concretization of the value estimation

In addition, section 3 provides a one-page overview of both value estimation and solution. Section 4 offers a brief perspective, especially in terms of expanding the digitalization solution to offer data for wind energy (VE) at sea.

Method

The basis for the analysis has been available figures and facts about environmental assessments, primarily using figures and estimates from COWI to establish baseline data for time and cost. Several interviews and meetings have been conducted to gather knowledge and information about the scope, perceived challenges and needs, and the presentation of the digital tools to:

- Three municipalities
- Three developers
- One consultant
- Danish Energy Agency
- Danish Environmental Protection Agency

The probability of value is derived by combining the documented baseline data for time and cost with the qualitative interview data, and on this basis, deriving indications of realistic savings potentials.
The results of the analysis are a *probability* of potentials within certain ranges and are therefore not a final result.
The analysis was conducted in the fall of 2023.

1. ANALYSIS: Value estimation of digitizing environmental assessments

Adding value to the environmental assessments process through the implementation of EA-Hub and EA-Tools.

The analysis consists of three sections:

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Demonstrating the societal value of EA-Hub and EA-Tools

Value estimation

The analysis focuses on the total value creation of all parties involved. Table 1 below shows a quantification of the likely value creation for the two main parameters of the analysis: Time and costs.

The plausibility is derived by combining documented baseline time and cost data (table 1.b) with qualitative interview data (table 3), which indicates realistic reductions of 10-30%.

Description	Baseline jf. Figures in table 1.b	10% reduction	20% reduction	30% reduction	Value range
Time					
Environmental assessments (average)	19 - 42 months.	2 – 4 months. New time: 17 – 38 months.	4 – 8 months. New time: 15 – 34 months	6 – 13 months. New time: 13 – 29 months.	2 – 13 months in time savings
Costs					
Annual costs for environmental assessments (range)	0,95– 1,75 billion DKK	95 - 175 million DKK New expens: 0,9 - 1,6 billion DKK	190 - 350 million DKK New expense: 0,8 - 1,4 billion DKK	285 - 525 million DKK New expense: 0,7 - 1,2 billion DKK	95 – 525 million DKK in financial savings

Table 1 – Value estimation for environmental assessments based on Table 1.b and Table 3

Baseline for environmental assessments

Baseline values used in the value estimation in Table 1 above are calculated based on the data shown in Table 1.b.

Description	Key Figures
Time	
Average process time for regulatory processes for onshore wind turbines – environmental assessment	18 – 42 months[1]
Average process time for regulatory processes for onshore solar PV installations – environmental assessment	16 – 36 months[2]
Average process time for regulatory processes at the Danish Environmental Protection Agency's environmental assessments	2 – 4 years[3]
Economy	
Value of the market for developers and consultants' work with environmental assessments in Denmark 2023 - Environmental assessment of projects - Environmental assessment of plans and programs Perspective of estimate: In 2012, the Danish Association and Consulting Engineers estimated that share data solutions could contribute a total socio-economic value of DKK 2.2 billion annually. [4]	350 million DKK 250-350 million DKK[5]
Value of public authorities' environmental assessment costs in Denmark in 2023 - Total costs for authorities – estimated to be between 50-150% of the value of the market for developers and consultants' work with environmental assessments in Denmark in 2023	350 – 1.050 million DKK[6]

[1] Provided by COWI

[2] Provided by COWI

[3] Informaiton from the Danish Environmental Protection Agency

[4] Association of Consulting Engineers Appendix 1.3.1 Letter of Interest from FRI.pdf

[5] COWI: Dreamsproject standard presentation_business_potential.pptx

[6] COWI: Dreamsproject standard presentation_business_potential.pptx

Table 1.b – Calculation of baseline values used in the value estimation in Table 1

Baseline and value creation for screenings

The qualitative analysis has shown that in addition to a sharp increase in the use of environmental assessments, many screenings are also being carried out on projects where the tools can also contribute significant value creation.

It has not been possible to obtain valid representative figures on process time for screenings. However, the table below shows that municipalities conduct thousands of screenings every year for projects. The municipalities believe that the tools will be immediately useful for these projects, even though the tools were initially developed with a focus on renewable energy on land. Therefore, there is also a large, additional value creation in making the tools available for screening applications. This is shown in Table 1.c below.

Description	Key figures	Value creation
Number of screenings in municipalities	Approx. 20,000 screenings annually*	Great value
Municipalities conduct screenings in a wide range of construction projects that do not require an environmental assessment but can obtain an approval based on a screening.	*The figure is based on extrapolation of data from three municipalities in the size range " small, medium, large"(Assens, Horsens and Aalborg) <u>Number of screenings per year</u> Assens: approx. 40-80 Horsens: approx. 300-400 Aalborg: many hundreds, based on the fact that the municipality has around 100 just on the groundwater area	The tools could immediately create great value in a very large number of screenings. The analysis has found that the process time of screenings can be several years if the application is incomplete and not fully informed. If the process time can be reduced by just a few months per screening, the potential is huge, simply due to the number of screenings. The two tools will help to ensure: • Applications are highlighted early in the application process • Easier process and guidance for smaller developers • Authorities can speed up the processing and assessment of informed cases, thereby both making decisions faster and saving resources to assist developers in preparing the application

Table 1.c – Value creation in the screening process

Other facts and figures about Environmental Assessments

The analysis has used a number of additional sources to support the plausibility of the socio-economic value, in order to get proportions and an experience-based basis in addition to interviews. Important key figures are presented below in Table 2.

Description	Key Figures
Value of the market for environmental assessment of projects in the EU in 2012	950 million EUR[7]
Value of the market for environmental assessment of projects in the EU in 2023	3-5.000 million EUR[8]
Estimated socio-economic value of easy access to environmental data and assessments	2.2 billion DKK[9]
Average process time for regulatory processes at the Danish Environmental Protection Agency's screenings	2 months – 2 years[10]
Number of environmental assessments annually in Denmark for 2020 – and rising - Projects - Plans - Compound	 67 164 6[11]
Number of environmental assessments annually in Denmark in 2020 handled by municipalites - Municipalities	 1.500 annually[12]
Number of environmental assessments in MST for the first 9 months of 2023	14[13]
Number of screenings in MST for the first 9 months of 2023	35[14]
Number of annual screenings in municipalities	Approx. 20.000[15]
Number of annual complaints Environmental Assessments/Screening	2/2[16]
Ratio between potential sites and developed sites (developers)	1000:25[17]
Cost of MV vs. Project cost	Typically 0,75-1 %[18]
Administrative costs per environmental assessments for authorities – based on average time spent	168.000 kr.[19]
Share of projects that will be changed as a result of the environmental assessment	Almost 50%[20]

Table 2 – Facts and figures about Environmental Assessments

[7] EU COMMISSION STAFF WORKING PAPER IMPACT ASSESSMENT.docx

[8] COWI, based on 2012 figures factor 3-5

[9] Association of Consulting Engineers Appendix 1.3.1 Letter of interest from FRI (1).pdf

[10] Information from the Danish Environmental Protection Agency

[11] Miljovurderinger-i-Danmark_1994-2021.pdf See figure 1

[12] Calculated on the basis of interviews (low estimat is put at 15 environmental assessments per municipality * 98 municipalities)

[13] Information from the Danish Environmental Protection Agency

[14] Information from the Danish Environmental Protection Agency

[15] Interviews with municipalities

[16] Information from the Danish Environmental Protection Agency

[17] Interviews with developers

[18] Interviews and EU COMMISSION STAFF WORKING PAPER IMPACT ASSESSMENT.docx

[19] 32 working days of 7,5 hours * DKK 700 - EU COMMISSION STAFF WORKING PAPER IMPACT ASSESSMENT.docx – side 6

[20] EU COMMISSION STAFF WORKING PAPER IMPACT ASSESSMENT.docx – page 7, reference 37

How the tools contribute to value creation

The input below is primarily qualitative – but together it adds up to estimated value creations in an order of magnitude as shown in Table 1. The table contains insights from interviews, fall 2023.

Description (EA = Environmental assessment)	**Assessment of value creation**		
Quantifiable qualitative inputs			
Time	*Big*	*Medium*	*Small*
- Save one field study (6-12 months) due to access to existing studies	x		
- Save 1-2 consultations (6 weeks per consultation) due to correct wording and data	x		
- Faster and more accurate screening of potential sites by developers and consultants potential areas, so that irrelevant areas can be quickly sorted out.	x		
- Better informed screening applications, thereby reducing time and resource consumption until a fully informed case (2 – 24 months)	x		
- The number of EA's is growing, so the potential of better data tools will increase in the coming years	x		
- A significant part of the time-saving elements are based on the benefits listed under the topics "security" and "more democratic processes"	x		
- Earlier clarification of which environmental parameters are considered "significant" in an EA	x		
- User-friendly data system creates a better overview and a data basis for the individual caseworker, thereby reducing bottlenecks in internal consultations in specialist offices and orders in the GIS department.		x	
- Fewer unnecessarily long reports, as the scope of the studies is aligned across actors and disciplines		x	
- More targeted involvement of relevant affected authorities and specialists by sharing specific, selected data extracts to streamline and concretize the collaborative dialogue.			x
- Better disclosure of screenings for both onshore RE and other construction projects will streamline the processing time for all screening cases			x
Finances	*Big*	*Medium*	*Small*
- Individual municipalities, agencies, developers and consultants each have their own GIS systems with associated operational resources. A common transparent data system can reduce the costs for further development and maintenance of data for their own systems	x		
- Developers can conduct multiple screenings in-house before handing over the EA work to a consultant	x		
- The time-saving elements of the different actors will allow for reprioritization of resources and contribute to efficiency	x		
- Smaller developers can prepare cases easier and thus cheaper, and with less burden on authorities, which today often perform a large part of the work for smaller developers		x	
Other qualitative value-adding inputs – prioritized by interviewees			
Security	*Big*	*Medium*	*Small*
- Greater assurance of getting all data early in the process – considered by many clients to be the key value of the tools	x		
- Efficient and user-friendly reviews of comparable EA's from previous projects provide assurance of the overall validity and the specific validity of project conclusions	x		
- Easy access to data and previous EA's creates a professionalization and systematization that ensures solid assessments in case of complaints to the board	x		
- Great potential in being able to hit the target more accurately in screenings – the municipalities experience that the cases that fall in the Complaints Board are typically those that have only screened without EA.		x	
- Common data system provides transparency across developers and authorities, and creates a source of common authoritative data that all parties agree on		x	
- Documentation and complete data reduces the risk of complaints		x	
- Better access to data and comparable EA's ensures adequate scoping note for the study		x	
Standardization (variant of primarily Time and Security)	*Big*	*Medium*	*Small*
- The tools will support much-needed standardization – 98 municipalities do it differently, making it difficult for developers	x		
- A standardization of data and a common platform will allow new data generated in a new project to be uploaded to the tools. A new project will be able to be uploaded to the tools	x		
- The possibility of an overview of comparable EA's will ensure standardization of the impact report in accordance with current law and practice	x		
- Strengthened data reporting practices by unified document structure – incl. Mandatory/optional		x	

- Categorized environmental parameters with associated data contribute to less complexity and different interpretations, and make the underlying data more usable		x	
Green transition and environmental rationale	*Big*	*Medium*	*Small*
- Increased speed and more solid foundations will streamline the planning phase for onshore RE and contribute to a faster deployment of green energy	x		
- Areas for RE on land are selected based on a holistic consideration of land use, by improving the possibilities of choosing areas based on environmental considerations rather than, for example, landowners earnings	x	x	
- Onshore RE is a growing industry – the need for shared data is acute and will support developers who will be able to complete more projects.			x
- Easier for municipalities to designate areas that they are required to designate			
Addressing ressource shortages (variant of Time)	*Big*	*Medium*	*Small*
- The overall streamlining provided by the tools increases the capacity of both authorities and developers, both of which have an increasing need for resources – both directly in environmental assessment processes and indirectly to raise awareness in all sectors	*x*		
New business opportunities	*Big*	*Medium*	*Small*
- Publicly available data will enable the development of products, concepts, and methods, especially in the first few years after the tools are established – after that, the ”first movers” will probably be caught up by the rest of the market and a ”new normal” with more effective products will emerge.		x	
More democratic processes	*Big*	*Medium*	*Small*
- Transparency in the assumptions can help demystify and avoid politicization of issues	x		
- Transparent and user-friendly system provides wider access for citizens to investigate the environmental parameters of land		x	
- Demystifying the process for less experiences builders and authorities		x	

Table 3 – Overview of which values the tools contribute to

2. DESCRIPTION OF SOLUTION: Detailed description of the solution and concretization of the value estimation

The description of the solution consists of the following sections:

Summary

The solution description in this section deals with the commissioning and further development of a cross-cutting central data and analysis tool for environmental assessments (EA-Hub and EA-Tools). The tool has the potential to help ensure that areas are selected based on a holistic view of land use and at the same time significantly accelerate the environmental assessment process by reducing process time, alleviating resource pressure, optimizing the interaction with the parties in the process, and thus achieving significant socio-economic savings. By making data available transparently to all parties, the expectation is that improvements can be made without increasing the number of complaints. This section describes the proposed solution, including the target group, data potential, the value in each phase and sets out the assumptions. The section unfolds the potentials substantiated in the analysis in section 1 of this report.

Issue

There is a sharp increase in the need for environmental assessments, which is expected to increase over the coming years. Likewise, developers, consultants and authorities are finding that practice in the field is placing greater demands on scope and detail. This creates problems for the green transition and there is therefore a need to accelerate the processes. There are a number of underlying issues in relation to this acceleration, which the proposed solutions in this report specifically address:

- Fragmented data makes it difficult for consultants, developers and authorities to get a comprehensive overview of existing data relevant to the environmental assessment. This leads to resources being spent on data collection that can be automated, slow case processing, risks of choosing the wrong areas and risks of overlooking things.
- Frequent updates of EU practice and board decisions make it difficult for consultants, developers and authorities to get an overview of what they need to consider in relation to environmental assessments.
- Inconsistent overview across developers, consultants and citizens about which data and factors need to be taken into account.

Solution: Cross-cutting central data and analytics tool (EA-Hub and EA-Tools)

To accommodate the necessary acceleration of the processes and to ensure continuous risk minimization and a common framework of understanding, a solution has been developed that brings together relevant data and environmental assessment material in one common solution, which ensures the following:

- Platform with user-friendly access to all national data including +2500 environmental assessment reports and board decisions, +700map layers with data targeted at environmental factors, + 45 million species observations, +70 million water environment observations.
- Automatic report generation, common analysis tools, collaboration space for the parties, integration interfaces to clients', consultants', and authorities' systems (reuse of data in own tools).
- Continuous follow-up on EU judgements and board decisions with the possibility of sparring with developers and authorities. Guidance is prepared by authorities and integrated into analysis tools. This can be established with the use of artificial intelligence.

Description of Solution

The tool is a groundbreaking step towards improving the environmental assessment process in Denmark.
The tool offers one-stop access to comprehensive environmental data, field observations and other environmental assessments. In addition to this, it gives users access to common data analysis tools and the ability to reuse data in their own tools. It also allows for automatic report generation and a collaborative space for all parties involved. As a digital platform, it creates the basis for safer criteria.
The target group for the tools is primarily building developers including their advisors and authorities, but will also be useful for NGO's, research institutions and citizens. The data collected is extensive and forms the backbone of the tool's potential. With the establishment of the tool, this amount of data will rapidly increase as large parts of the environmental assessment process move in, making the tool a national database for environmental assessments.
A basic version of the tool's two parts is already available:

- EA-Hub – library for existing environmental assessments, related documents and board decisions.
- EA-Tools – analysis, reporting and collaboration tool.

EA-Hub basic version is proposed to be extended with the following:

- Expand the tool to include screening decisions and feasibility studies.
- Further develop search using artificial intelligence in existing material in EA-Hub and in appeal board decisions.
- Easy reporting of environmental assessments and related material – e.g. in collaboration with the Danish Planning Agency.
- Systematized collection of structured deep data from environmental assessments or feasibility studies.
- Customize and further develop features based on user experience in the basic version.

EA-Tools basic version is proposed to be extended with the following:

- Collaboration space with the ability to share studies and conduct consultations.
- Easily search all observations in species data and aquatic environment data from the Danish Environmental Portal's systems.
- Special searches that target relevant species findings on specific project types e.g. wind turbines or solar cell projects.
- Ability to add your own data in searches and reports.
- Expand integration interfaces to other systems, e.g. for clients to retrieve data for their own systems.
- Provide guidance on EU rulings and board decisions, as well as the need for exemptions and special permits.
- Customize and further develop features based on user experience in the basic version.

Concretization – value estimation

The measure is expected to provide the following value:

- Reduce socioeconomic costs by 95-525 million as a result of fewer projects having to be abandoned, faster process time for environmental assessments and less risk of backlogs.
- A time saving of 2-13 months for the estimated total time per environmental assessment.
- Help ensure that land is selected based on a holistic approach to land use.
- Address resource shortages and thus bring up the capacity of both authorities and developers.

The above estimates are substantiated in the analysis in section 1 based on dialog with stakeholders, including developers. It is expected that the implementation of the tools will transform the way environmental assessments are conducted because the tool can deliver significant benefits throughout the environmental assessment process. Below illustrates the value of the tool at each stage of the assessment process, under the common denominators of shorter process time and socio-economic savings. Furthermore, developers value safety over finances.

Table 1 – Time value creation in the phases of the environmental assessment process

Phase	Value creation - Time
Projekt planning	• Developers and consultants gain access to comprehensive environmental data, facilitating analysis and saving time on internal screenings of potential sites. • Efficient collaboration between developer and municipality with shared data understanding, so they can prepare a complete application for a specific area faster. • Smaller developers can do their own site screening before applying for a permit.
Clarification: requirement for environmental assessment?	• Faster and correct clarification of whether screening will be sufficient based on full insight into data about the area. • Developers have a high degree of autonomy to assess whether and environmental assessment is required and move directly into the process. • Time saved for all parties by not screening if it is clear early on that an environmental assessment is necessary.
Screening	• Fully informed and better quality-assured applications allow authorities to move more quickly to assessments and reduce the number of hearings. • Faster progress by not screening projects that require a full environmental assessment. • Access to other studies enables reuse of knowledge and decisions, promoting both speed and quality of screening report.
Environmental assessment	• Accelerating the environmental assessment process through data access and automation, where data from multiple databases enables automated scoping reports with minimal post-processing. • An overview of necessary field investigations facilitates the field investigation program and the preparations of a comprehensive environmental impact report. • Reusing other field surveys can save a season. • Transparency and better information will save time on internal and external consultations.

Table 2 – Economic value creation in the phases of the environmental assessment process

Phase	Value creation – Economy
Projekt planning	• Developers can perform analysis based on the tools and save resources on maintaining their own GIS systems. • Transparent and efficient access to data reduces financial burdens for smaller builders.
Clarification: requirement for environmental assessment	• Authorities have the same access to data and can make assessments based on previous environmental assessments, reducing resource consumption on information searches.

Screening	• Authorities can perform analysis based on the tools and save resources on maintaining their own GIS systems.
Environmental assessment	• Full access to data ensures resources are not spent on unnecessary field research.

Table 3 – Collateral value creation in the phases of the environmental assessment process

Phase	Value creation - Security
Project planning	• Solutions help developers select sites with minimal risk of rejection. • Developers can prepare their own analyses on the same data sources that the authorities must assess them on.
Clarification: requirement for environmental assessment	• Authorities and developers have the same access to data, giving developers more confidence that they haven't overlooked data that could impact site suitability.
Screening	• Authorities can perform analysis based on the tools and save resources on maintaining their own GIS systems.
Environmental assessment	• Better informed environmental impact reports and decision-making. • Data access allows you to quickly narrow down topics to include only relevant environmental parameters. • Searching for similar permits improves decision-making. • Linking to board decisions and using AI minimizes the risk of repeating errors, including in terms of mitigation measures. • Easier interaction and dialogue through standardization, fixed templates and guides, collaboration spaces and integration interfaces to developers, consultants' and authorities' systems.

The dialogue with target group representatives indicates a high level of interest in the tool. The preliminary presentations of the tool's design and idea have received very positive feedback on potential value, both in terms of application potential, functionality and user-friendliness.

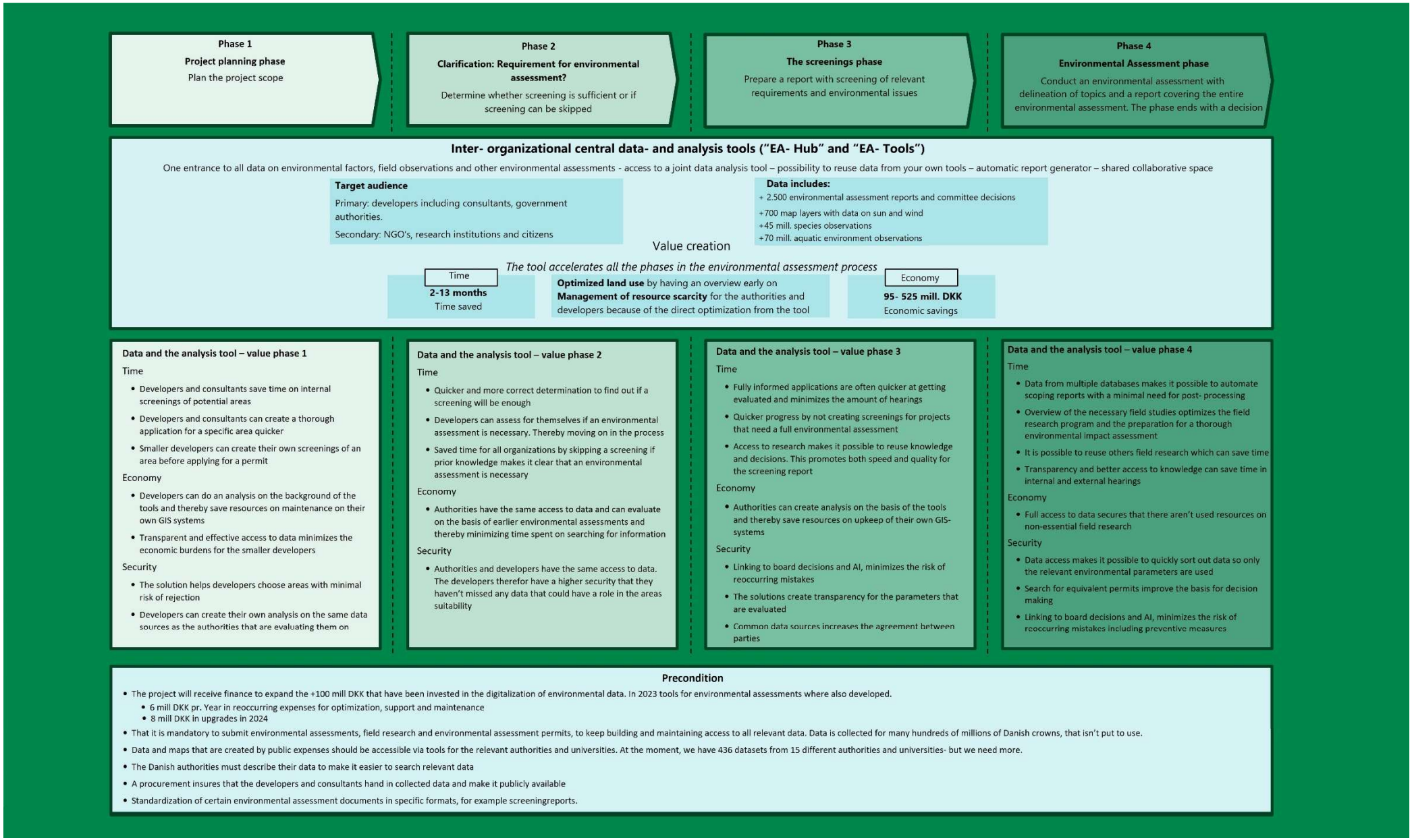
Prerequisites

- Mandatory reporting of environmental assessments, field studies and environmental assessment permits to continuously build and maintain access to all relevant data. Hundreds of millions of Danish crowns worth of data is being collected that is not being used.
- Data and map layers collected with public money are made available via interfaces by the relevant authorities and universities. We currently have 436 datasets from 15 different authorities and universities – but more are needed.
- Public authorities describe their data to facilitate the dissemination and searchability of relevant data.
- Tenders require clients and consultants to make collected data publicly available.
- Standardization of selected environmental assessment documents, i.e. fixed formats for e.g. concept papers and screening reports.
- Reuse of the + 100 million DKK invested in digitizing of environmental data including 10 million DKK spent on digitizing environmental assessments.

Time horizon

Ultimo 2023 – First base version of the tool available with all publicly available map data and first version of all analysis and collaboration features and integration interfaces to external systems, as well as access to existing environmental assessments and related material.
Medio 2024 – Second version of the tool expanded with easy access to deep species observations, artificial intelligence, extended collaboration features, targeted reports for different construction project types, and integrating government guidance on judgments and decisions into the tool. Establishment based on user experience and more data.

3. One-page overview of both value estimation and solution



4. Perspective

In continuation of the above value estimation, a number of future opportunities for significant value creation have also been identified. As described in this analysis, the tools EA-hub and EA-tools create significant value (in terms of time and money) for environmental assessments and screenings on land. By extension, there is also great potential for developing the solutions to produce the necessary data insights for environmental assessments at sea. In the current situation, systems such as Denmark's Land Information (which partially provides relevant data for land-based projects) do not exist at sea, and thus there is a lack of central data sources at sea. At the same time, marine environmental assessments are on the rise, and with the government's ambition to establish 35 GW of wind farms in the North Sea by 2050, there will be a number of projects that will have a great need for central, transparent data sources and experience from previous environmental assessments.

The table below shows an estimation of the potential value creation from the development of key solutions such as EA-hub and EA-tools for environmental data at sea:

Description	**Baseline (1% of the construction sum)**	**5% reduction**	**10% reduction**	**15% reduction**	**Value range**
Economy (finances)					
Environmental assessments correspond to 1% of the total project sum for renewable energy projects (which is low for offshore projects). In the government's plans for 2050, 35 GW of offshore wind is to be established. Each GW has a construction cost of approximately DKK 14-15 billion, and it is assumed here that 3 GW of the 35 GW have already been established. 14 billion DKK * 32 GW = DKK 448 billion	4.48 billion DKK	224 million DKK in savings	448 million DKK in savings	672 million DKK in savings	224 – 672 million DKK in financial savings

Furthermore, there are several perspectives in the current solutions that can also be worked on and utilized.

Other potentials – *non-exhaustive list*
Monitoring data for installations, e.g. based on the required monitoring period in the §25 permit
Artificial intelligence – further unlocking the possibilities
International data – e.g. Sweden and Germany collect huge amounts of data that should be shared. The tools EA-Hub and EA-Tools have the potential to accommodate international collaboration. CIP: *"You are on a very, very important mission here. Keep in mind that the business case for a project is not dependent on the environmental assessment. Everyone should therefore throw all data into the pool. Also international data"*
Reuse of data in relation to general environmental monitoring programs in Denmark (NOVANA etc.)
…

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