

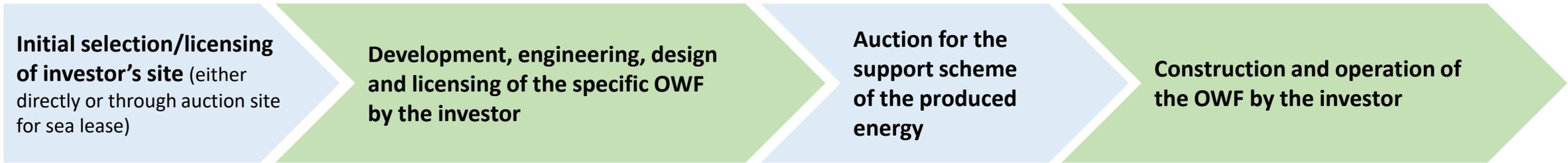
REGULATORY FRAMEWORK FOR OFFSHORE WIND FARMS: THE INTERNATIONAL EXPERIENCE AND THE BASIC DESIGN PRINCIPLES FOR GREECE

Preliminary Presentation – For discussion purposes

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Alternative institutional frameworks for Offshore Wind Farms (OWFs) development

Decentralized Development Model



Centralized Development Model



Intermediate Development Model



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Suggested development model for OWF in Greece

OWF development targets
(until 2050)

Strategic planning for OWF's grids development (hubs)

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Elaboration of Specific Frames of Development Terms for OWFs (through either local Strategic Environment Assessment or the integrated Maritime Spatial Planning)

For each SFDT OWF : incorporation of the required grid works (hubs) in the TYNDP by the IPTO

Auctions for sliding FiP contract

The investor acquires sliding FiP contract, Producer's Certification, binding GCO, starts the EIA procedure and the procedure of sea concession and constructs the project

Ministry of Environment and Energy

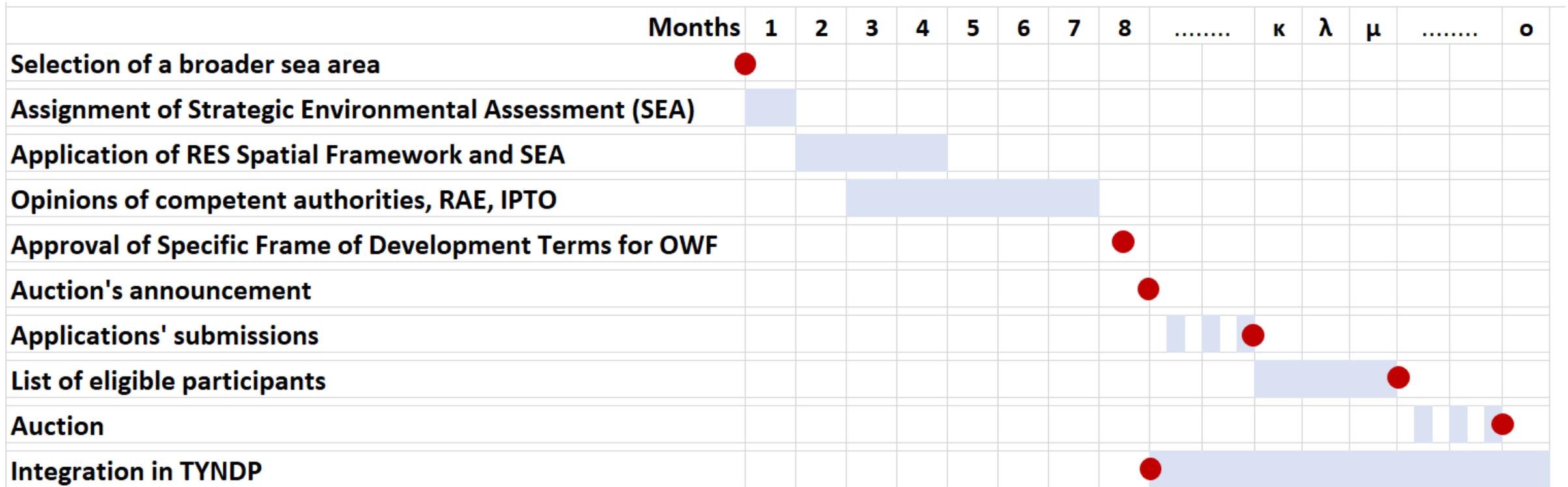
IPTO

RAE

Investor

- The Specific Frames of Development Terms for OWFs (SFDT OWF) will not determine specific installation sites. They are based on the RES Spatial Planning Framework and on additional criteria (environmental protection, tourism, fishing, navigation, defense) and they may define exclusion zones within a broader sea area (that initially might be the sea areas within the territorial waters of a group of regional units or municipalities).
- Sliding Feed-in Premium is the current support mechanism for onshore wind in Greece. It works almost like a CfD contract.

General Timetable for the 1st auction

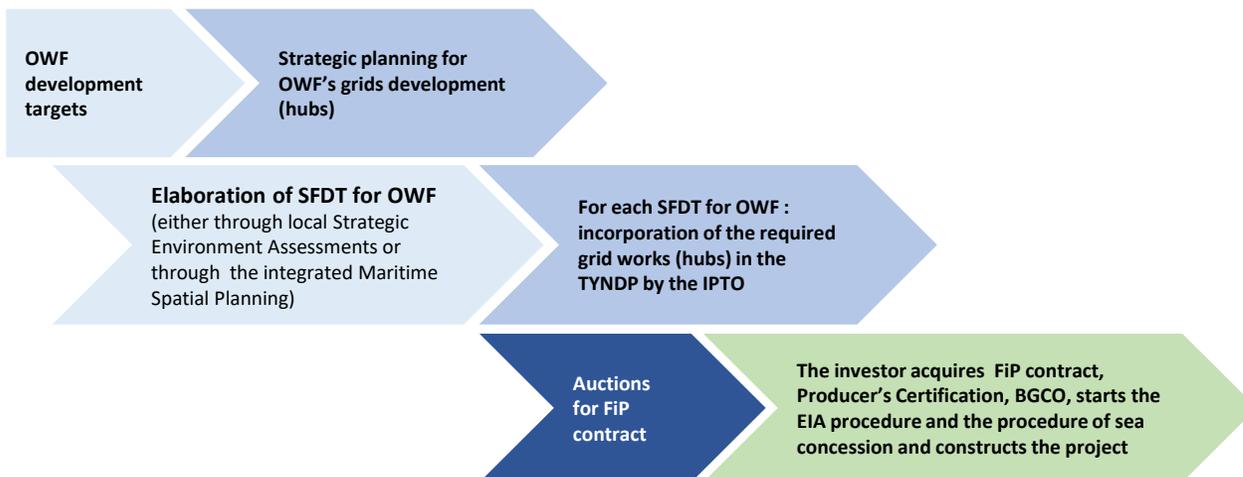


The time periods (i) between the announcement of the auction and the applications' submissions and (ii) between the evaluation of the on / off criteria for the selection of the eligible entities and the auction, can be set for a duration that will be decided upon, in order to provide sufficient time to the investors to study their prospect projects.

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Advantages of the suggested OWF development model

- Excessive public investments and excellent administration efficiency are not required (contrary to the centralized model).
- The investors won't be exposed to high development risk (contrary to the open- decentralized model), which in Greece, combined with the risk of bureaucracy and the absence of specific planning, would be intolerable.

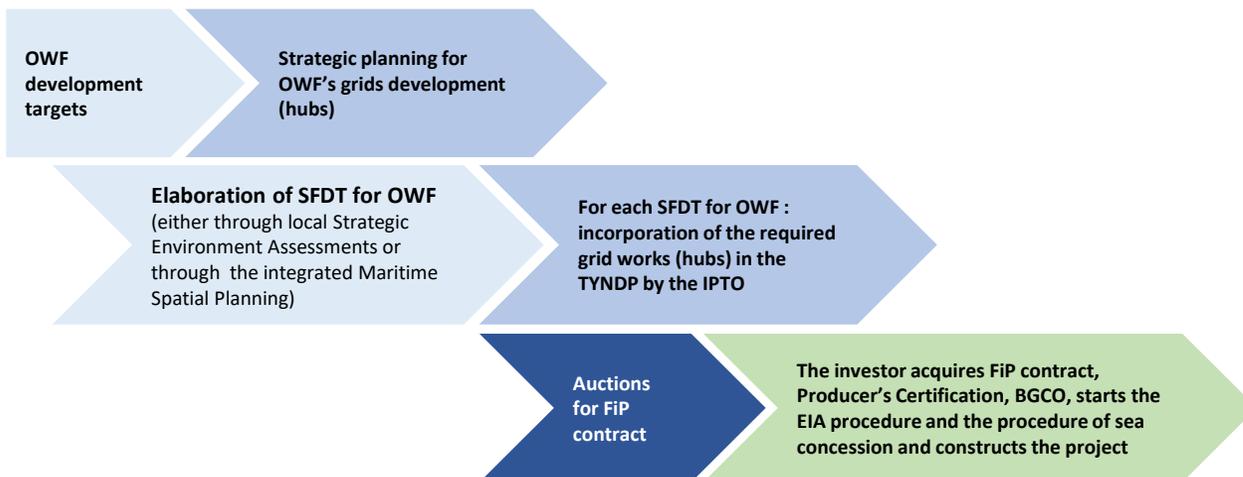


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Suggested development model for OWF in Greece - Grid

It is crucial that the OWF grid development will lead to optimal solutions and will not burden the price of the produced energy.

Therefore, the centralized planning seems to be a rational choice.



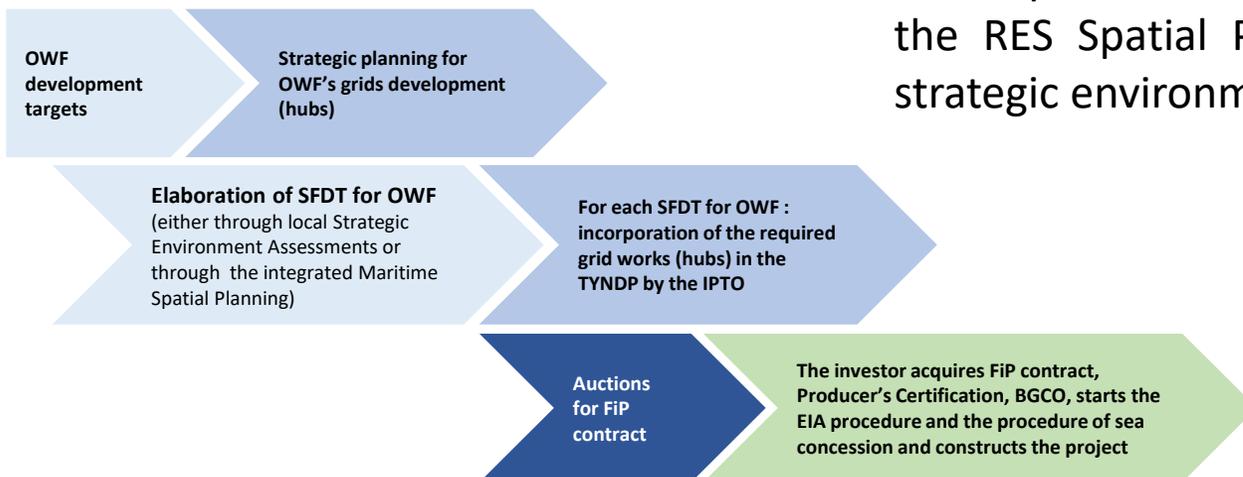
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Suggested development model for OWF in Greece – Maritime spatial planning

Particular attention must be given to how the development of OWF will be combined with the maritime spatial planning, which is one of the country's obligations under the European legislation.

When the maritime spatial plans will be prepared, they should contain the initial environmental assessment for OWFs and should define targets for wind capacity within the areas they refer to. The Specific Frames of Development Terms for OWFs (SFDT OWF) must also be approved together with the maritime spatial plans.

Until then a solution must be found: The definition and the environmental evaluation and approval of some first Specific Frames of Development Terms for OWFs (SFDT OWF) in broader areas, based on the RES Spatial Planning Framework and additional criteria within a strategic environmental assessment.

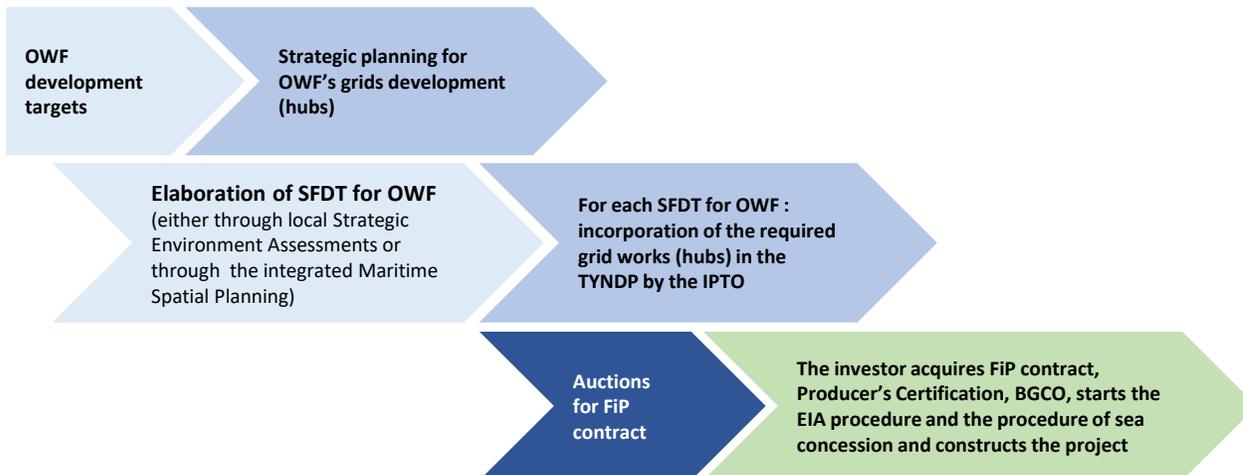


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Suggested development model for OWF in Greece – Step 1

Step 1: The Minister of Energy announces:

- The broader area within which the first Specific Frame of Development Terms for OWFs (SFDT OWF) will be elaborated
- The timetable for the elaboration and approval of the Strategic Environmental Assessment of this SFDT OWF
- The timetable of the first auction
- The road map of the integrated Maritime Spatial Planning through which the rest of the SFDT OWF will be shaped
- The vision for offshore wind energy development until 2050 and the relevant broader areas



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Suggested development model for OWF in Greece – Step 2 (I)

Step 2A: IPTO elaborates a strategic study for grids' development concerning the interconnection of OWFs until 2040/2050.

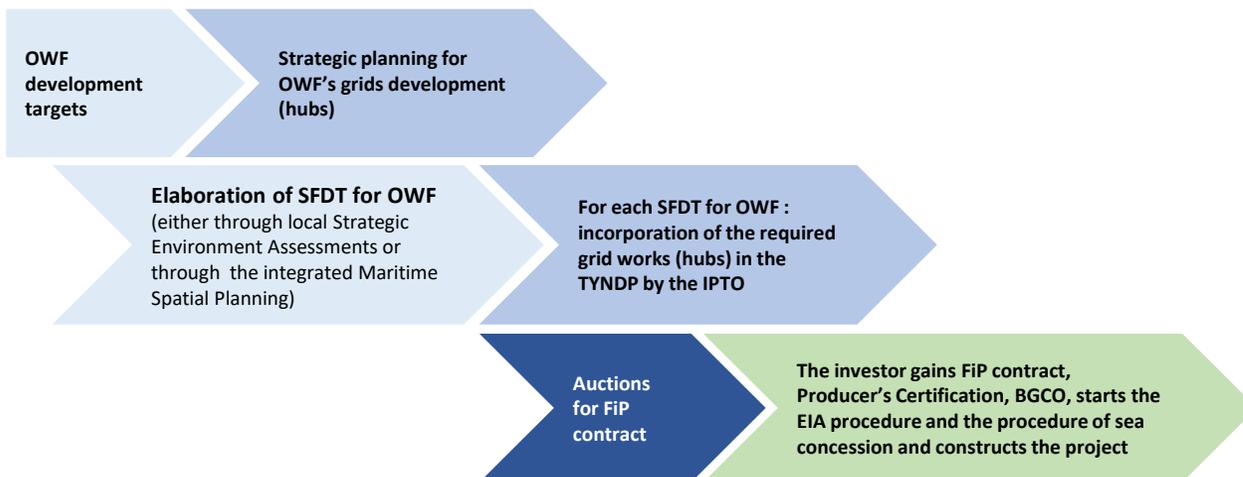
In this manner some grid hubs in the Aegean sea are defined.

Step 2B-I: Before the approval of the Maritime Spatial Plans

OWF are installed based on the Specific Spatial Planning Framework for RES.

The Minister of Energy elaborates Strategic Environmental Assessment for a broader area. Along with the Strategic Environmental Assessment, the Specific Frame of Development Terms for OWFs (SFDT OWF) in this area is approved. The first milestone e.g. 300MW, is crucial.

Within this approval, IPTO opines on the basic terms of the OWFs interconnection as also all the authorities involved in the sea lease, in order to be bound by this opinion.



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Suggested development model for OWF in Greece – Step 2 (II)

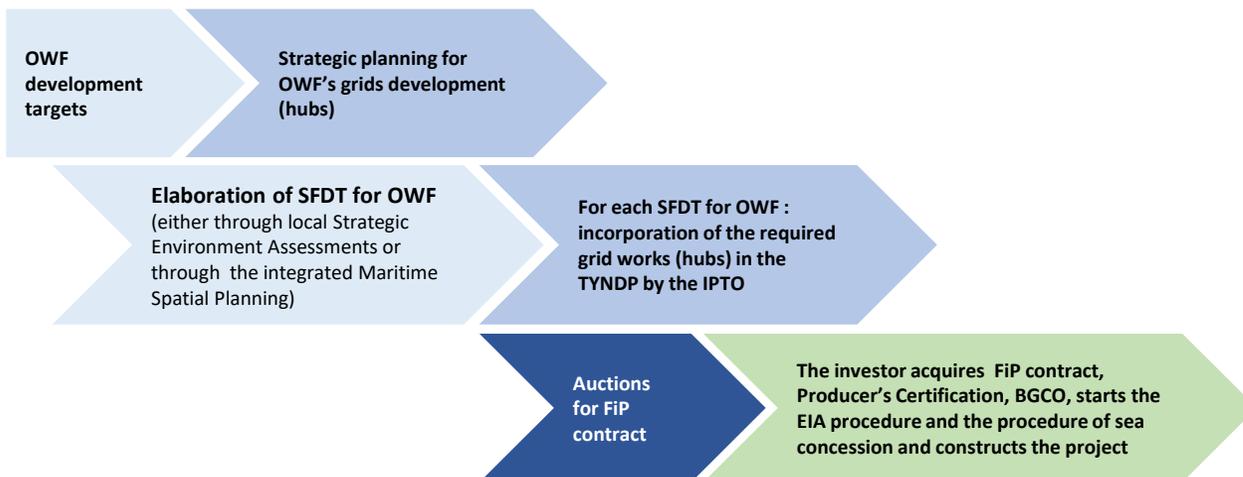
Step 2A: IPTO elaborates a strategic study for grids development concerning the interconnection of OWFs until 2040/2050.

In this way, some grid hubs in the Aegean sea are defined.

Step 2B-II: During the approval of the Maritime Spatial Plans

Each Marine Spatial Plan contains the relevant Specific Frame of Development Terms for OWFs that are also approved together.

In this case also, within the context of each approval, IPTO opines on the basic terms of the OWFs interconnection as also all the authorities involved in the sea lease, in order to be bound by this opinion.



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Suggested development model for OWF in Greece – Step 3 (I)

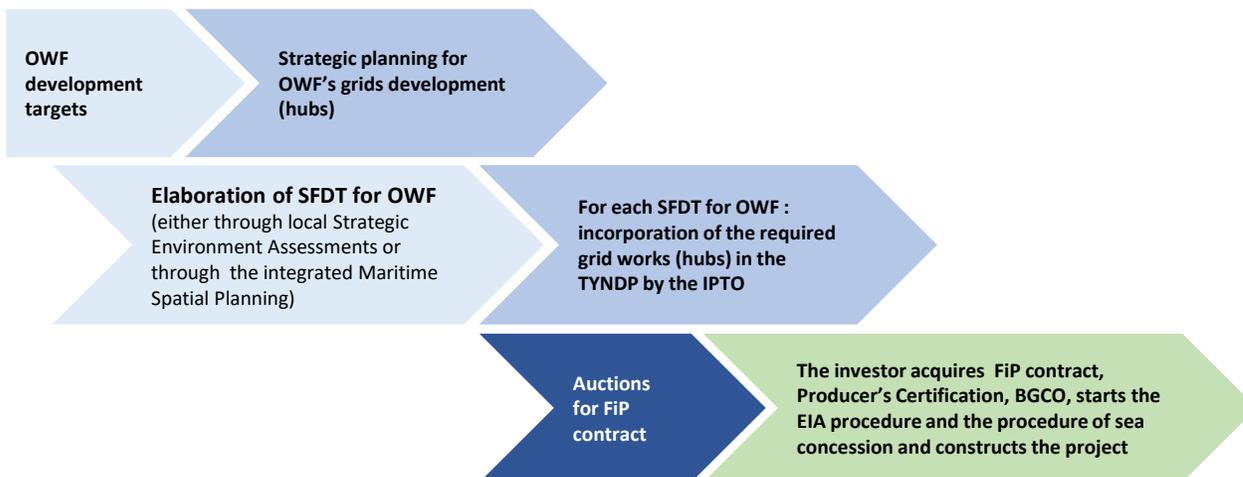
Step 3A: Following the approval of each Specific Frame of Development Terms for OWFs (either by a local strategic environmental assessment or through the integrated maritime spatial planning), IPTO includes the grid connection works to the relevant grid hub in its program and commences their construction. The works are such so that they can absorb the foreseen wind capacity for the area until 2040/2050.

Step 3B: After the approval of each Specific Frame of Development Terms for OWFs, RAE announces auctions for Sliding Feed-in Premium (sFiP) Contracts based on the reference value criterion.

Initially, RAE announces the first auction for the capacity of the first milestone.

Sliding Feed-in Premium is the current support mechanism for onshore wind in Greece. It works almost as a CfD contract (with a small fluctuation, $\pm 1,5\%$, around the strike price). More details may be found here:

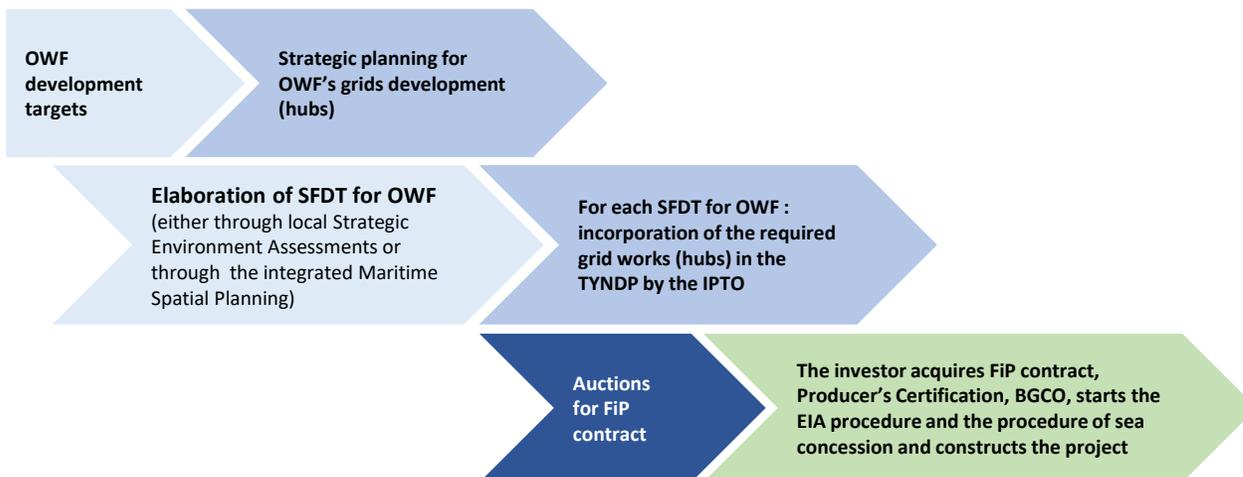
<https://eletaen.gr/en/the-effect-of-the-fip-scheme-to-the-revenues-of-a-wind-farm-journal-of-physics/>



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Basic on/off criteria

- the participant must have a transparent shareholding structure and must meet criteria of transparency and verification of the shareholders' identity,
- technical competence and experience in the development and operation of onshore or offshore wind farms,
- financial adequacy,
- issues related to national security, public health and safety must not exist
- the technology must be mature, or certified, or able to obtain certification



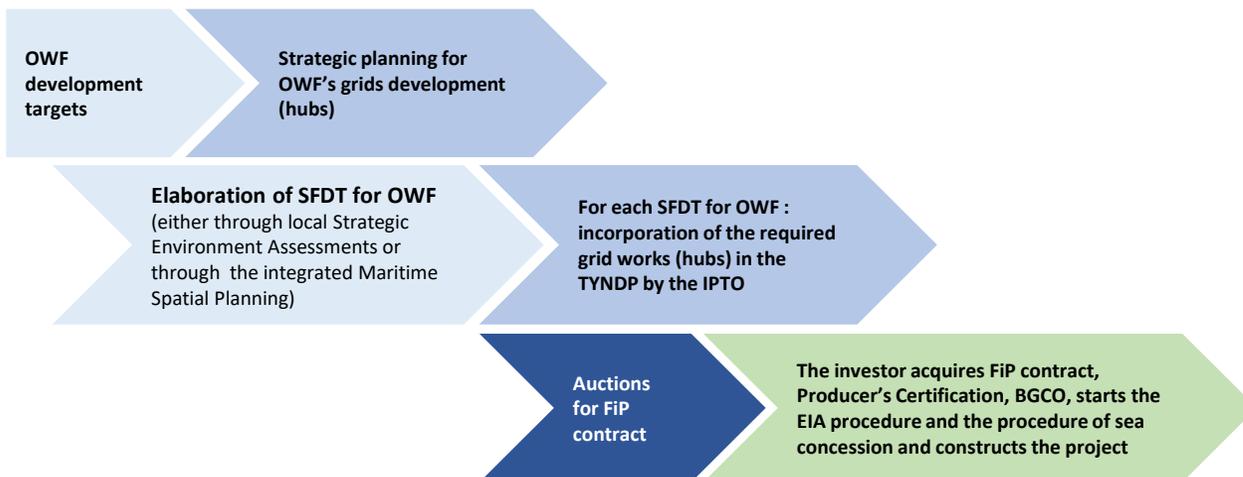
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Suggested development model for OWF in Greece – Step 4

Step 4: The lower bidder(s) receives sFiP contract, Producer's Certificate, binding Grid Connection Offer and starts the process of EIA and sea concession.

In order to provide more flexibility during the detailed engineering and licensing, the selected bidders(s) has(ve) the right to develop the OWF within a wider area-polygon, always within the broader area that had been announced for the auction (rule xD, $x = 100-200$).

However, he is obliged to limit the sea area to a more specific polygon within a specific timetable and definitely before the submission of the EIA study (rule yD, $y=15-20$).



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Example

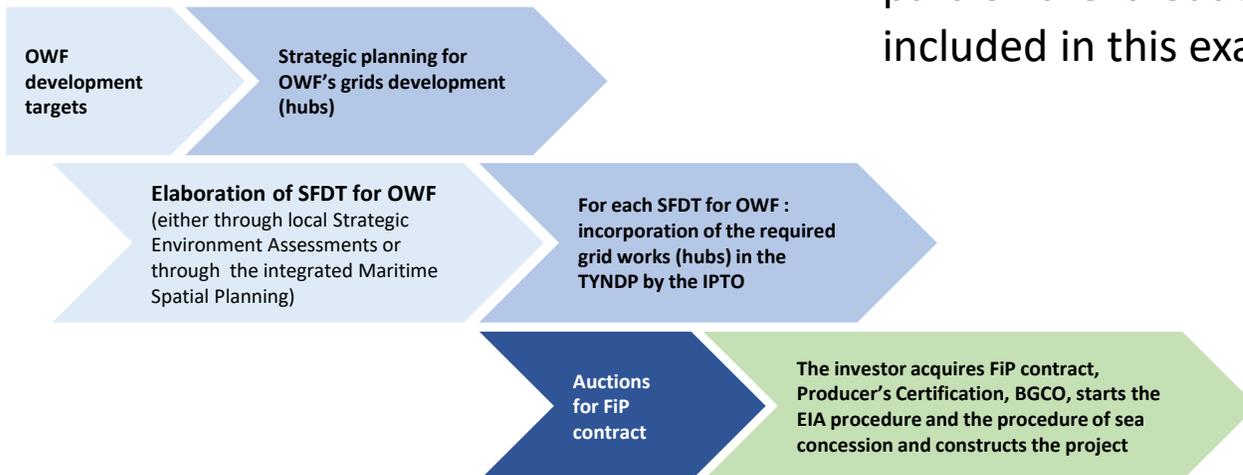
Important note:

The following example is only indicative.

It is not based on any study or scientific judgment, neither for wind potential, nor for the exclusion zones, nor for environmental, electrical or other constraints (e.g territorial waters, EEZ, etc.).

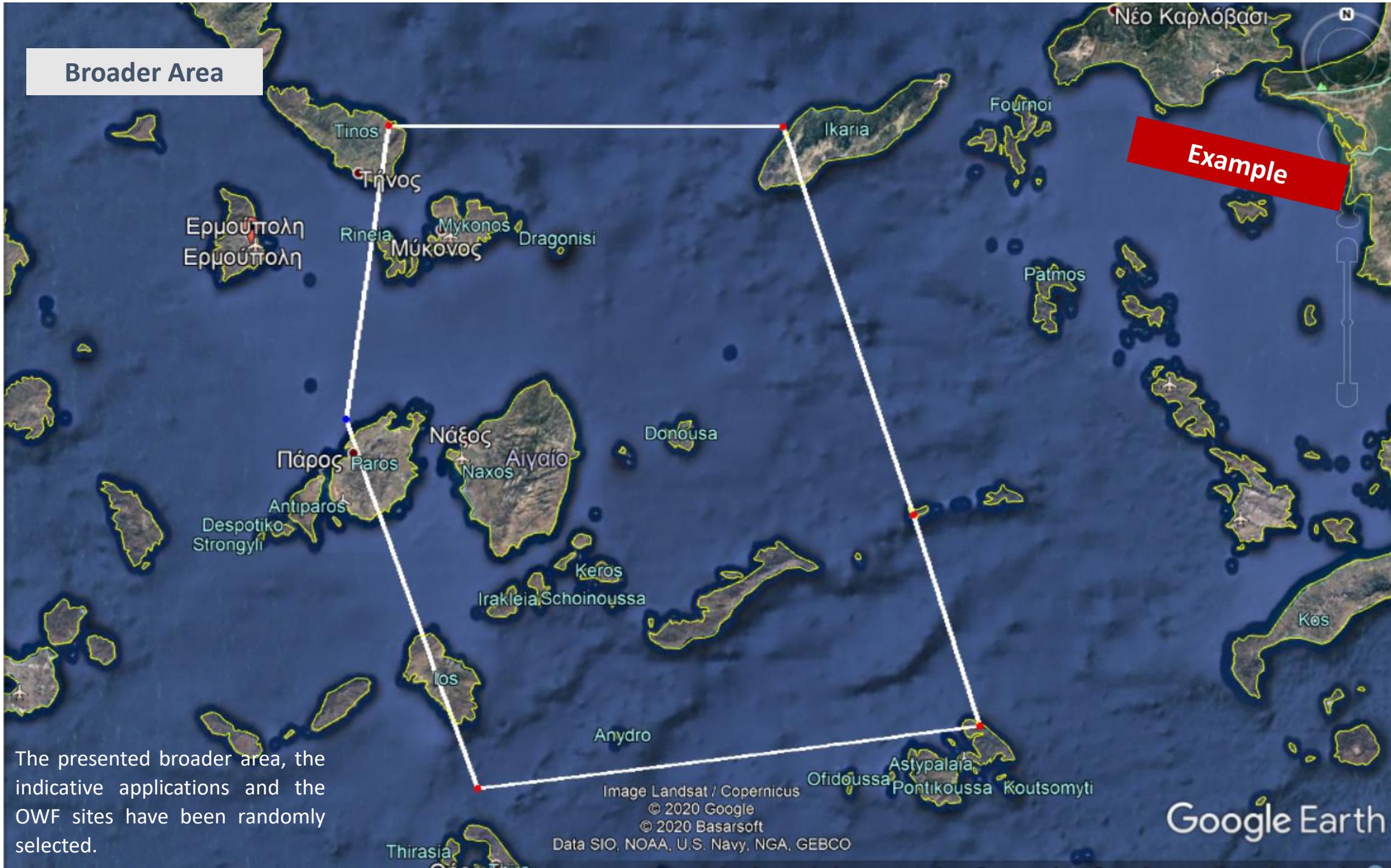
The presented broader area, the indicative applications and the OWF sites have been randomly selected.

Therefore, nothing in this example can prejudge or presuppose any future judgment for the suitability or the inappropriateness of all or part of the broader area or of the exclusion zones or the OWF sites included in this example.



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Broader Area



The presented broader area, the indicative applications and the OWF sites have been randomly selected.

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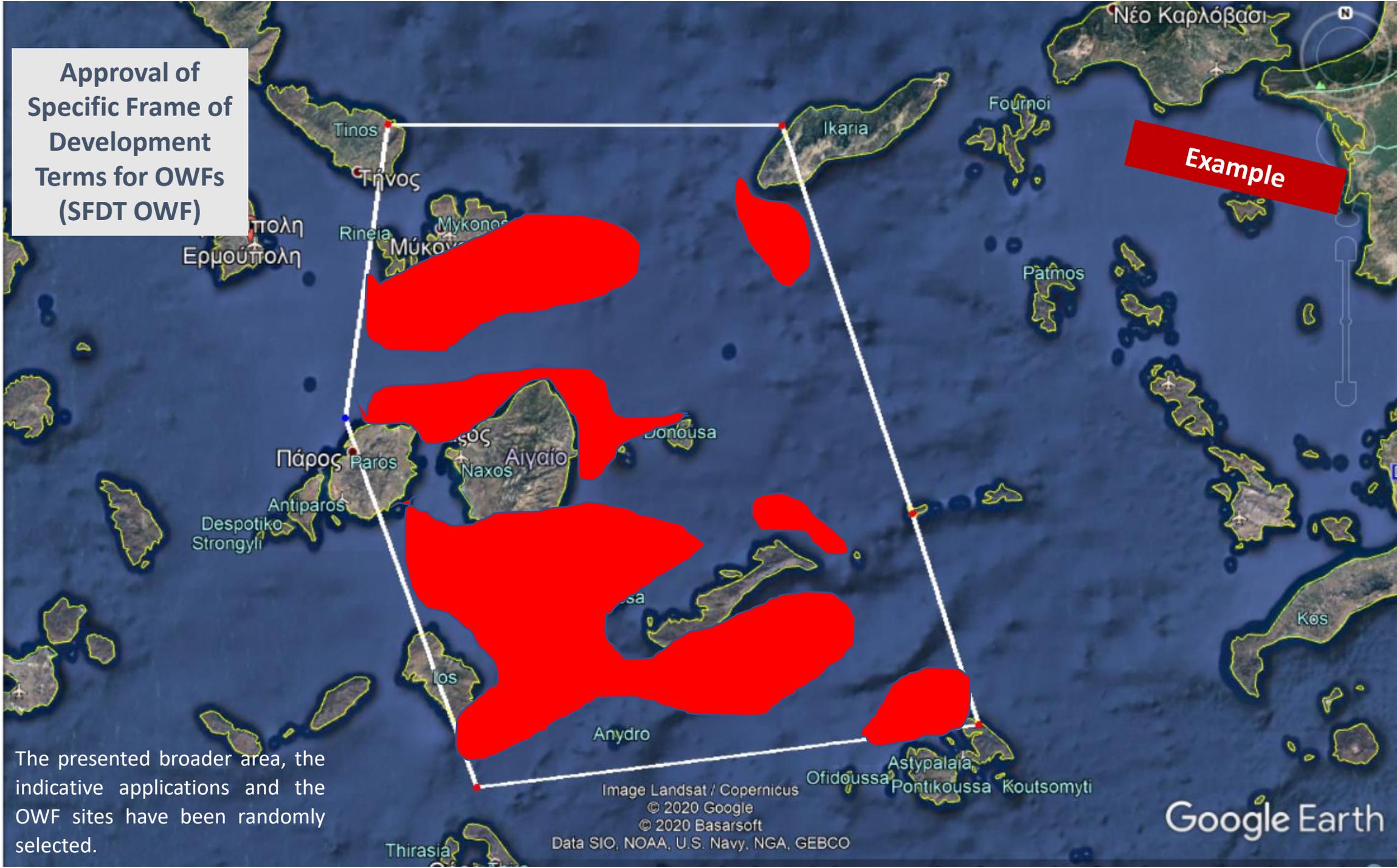
Approval of
Specific Frame of
Development
Terms for OWFs
(SFDT OWF)

Example

The presented broader area, the
indicative applications and the
OWF sites have been randomly
selected.

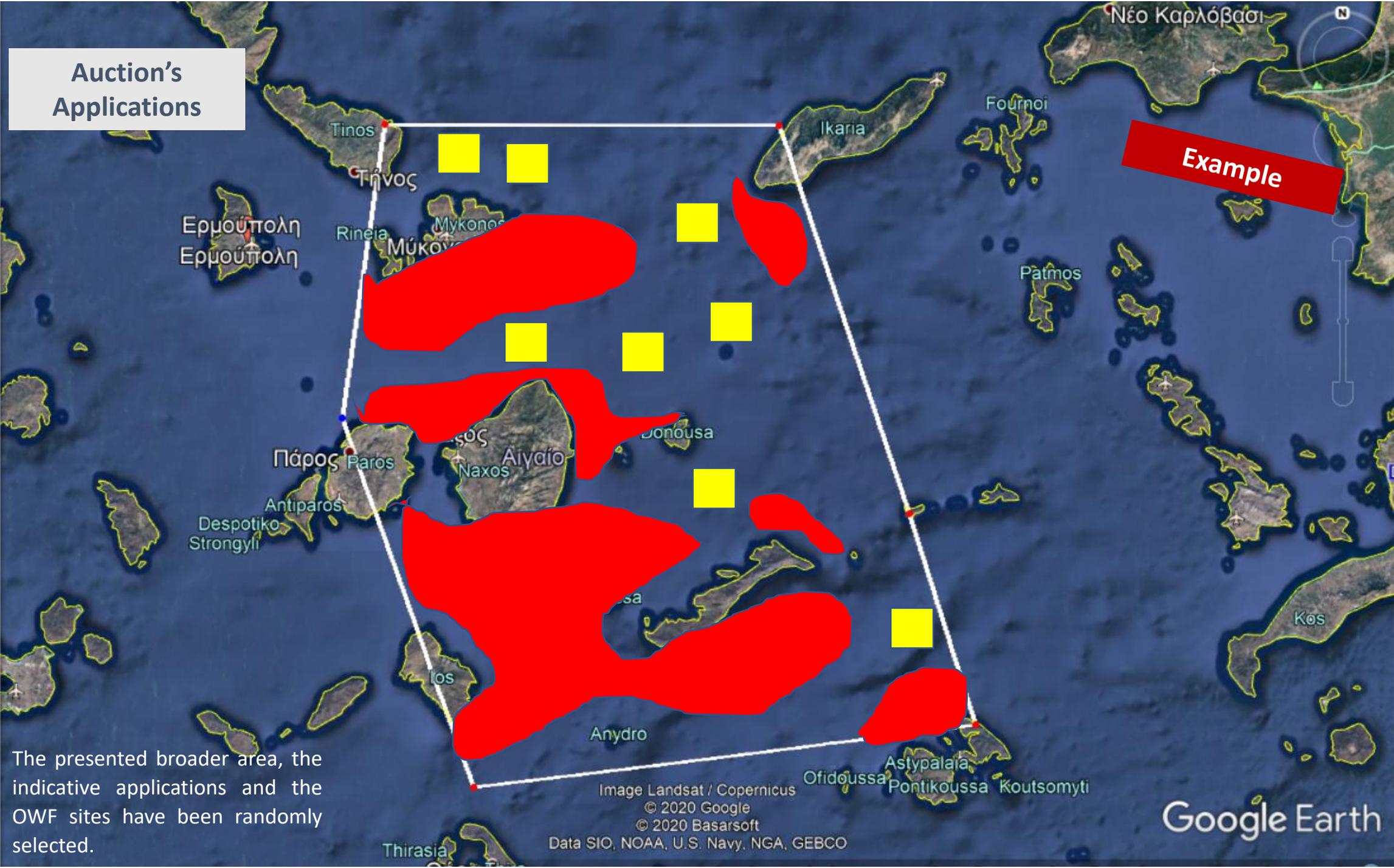
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Auction's Applications

Example



The presented broader area, the indicative applications and the OWF sites have been randomly selected.

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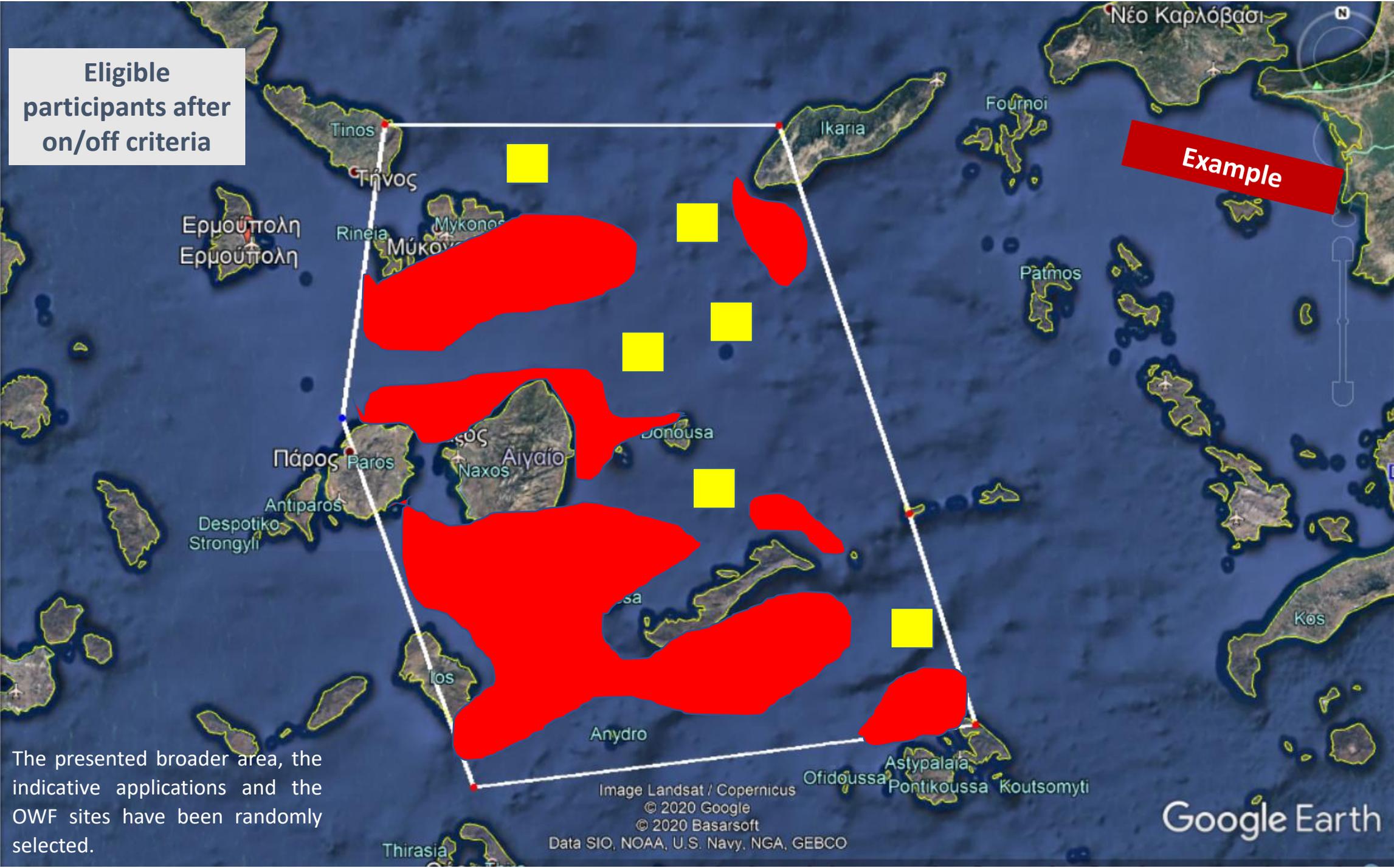
Eligible participants after on/off criteria

Example

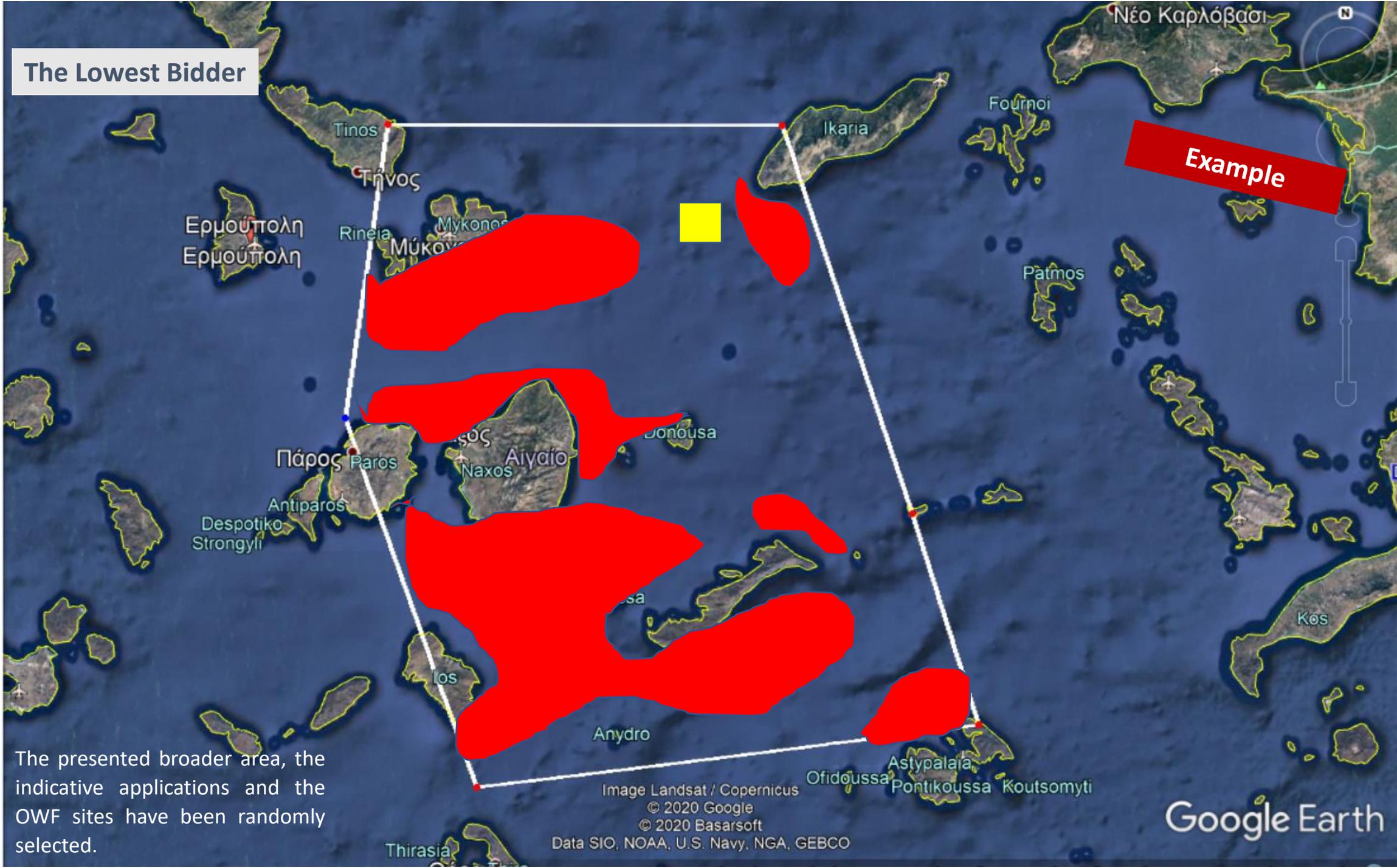
The presented broader area, the indicative applications and the OWF sites have been randomly selected.

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The Lowest Bidder



Example

The presented broader area, the indicative applications and the OWF sites have been randomly selected.

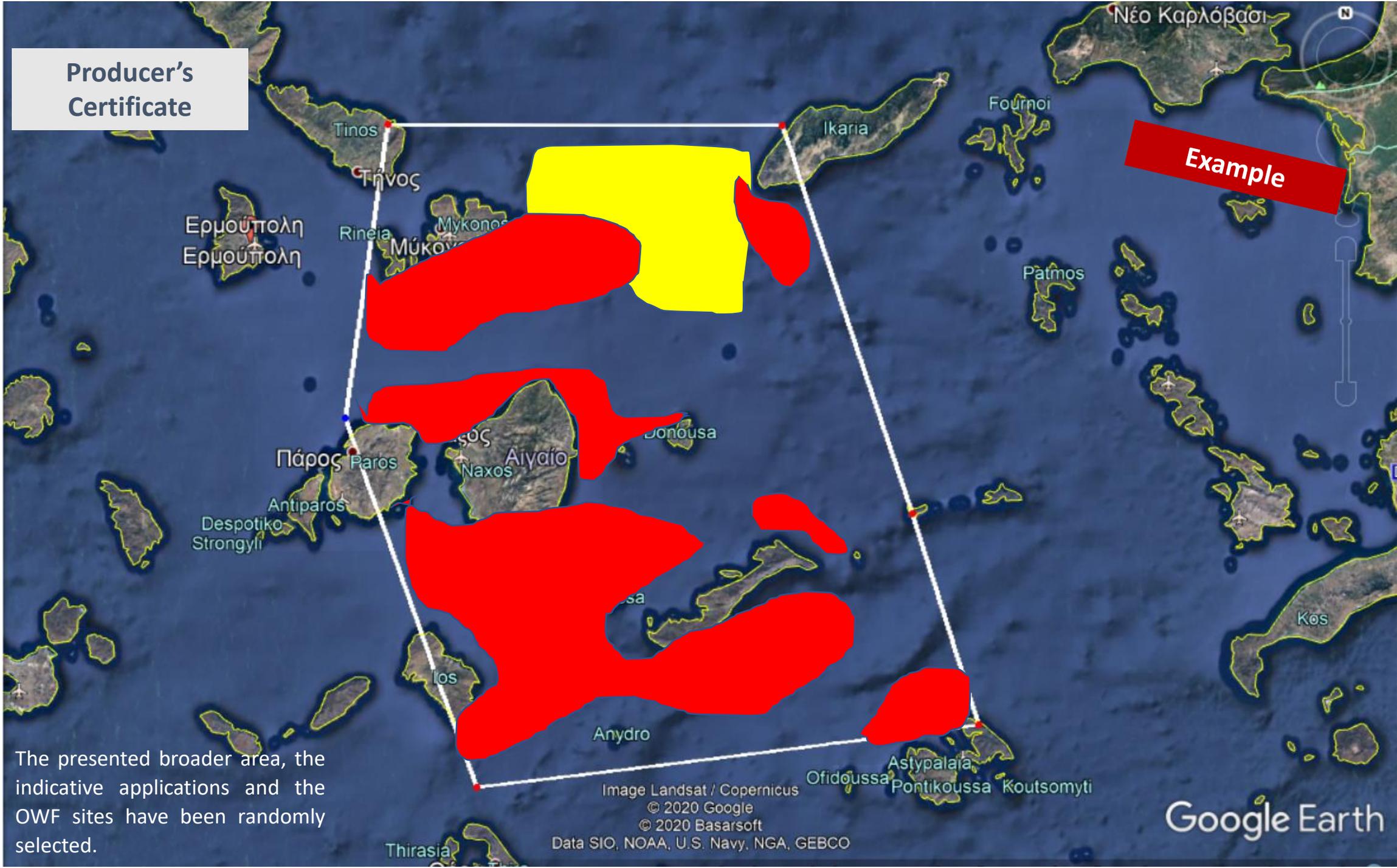
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Google Earth

Producer's
Certificate

Example

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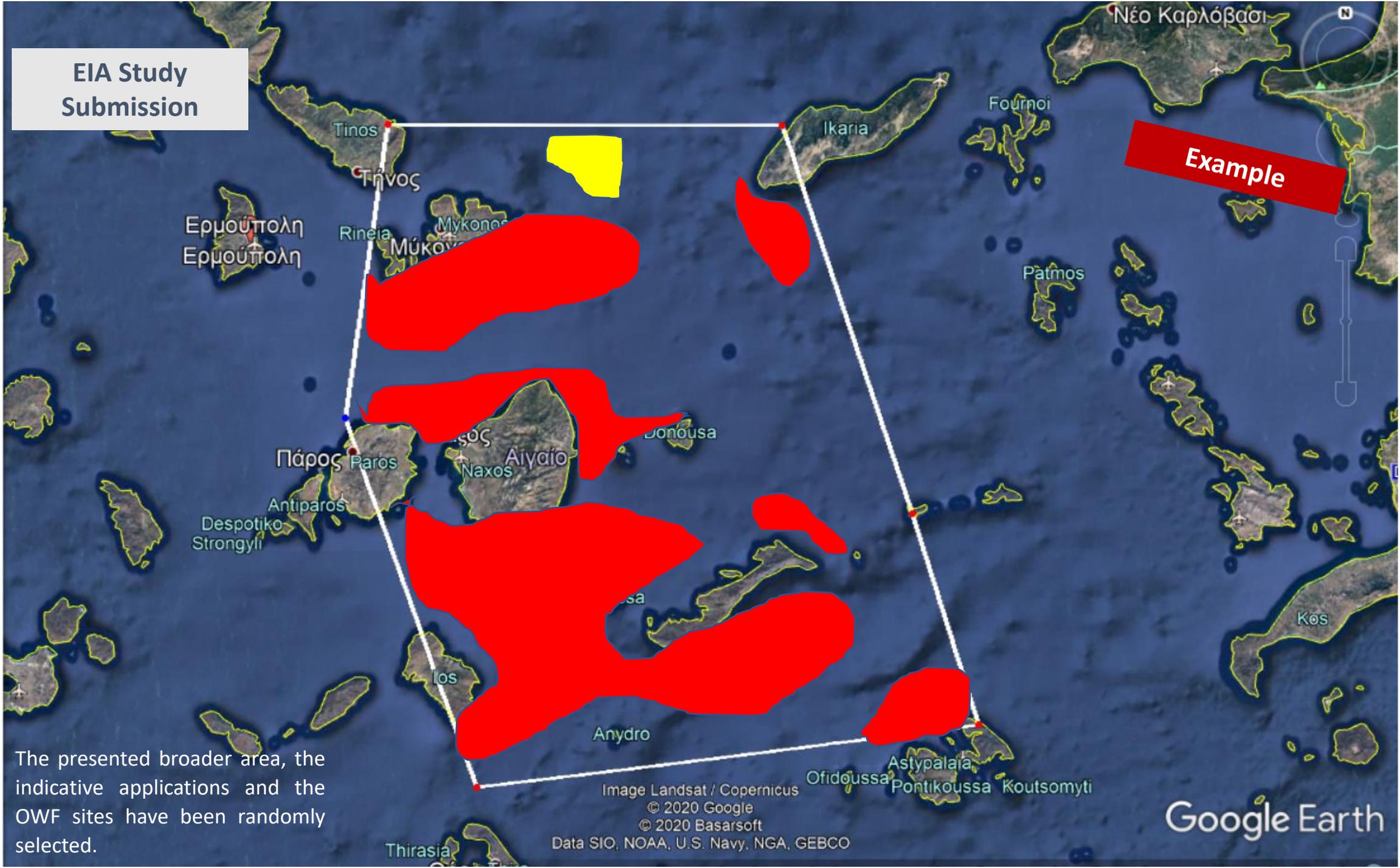
EIA Study
Submission

Example

The presented broader area, the indicative applications and the OWF sites have been randomly selected.

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Suggested development model for OWF in Greece – Other features

- Announcement of a clear and detailed roadmap with specific milestones for the next 2-3 years.
- Specific quantitative targets for the implementation of OWFs in the next decade and beyond, until 2050
- Strict time limits to the licensing authorities.
- Action plan for the development and licensing of required infrastructure (ports, shipyards, special ships and equipment) that will be necessary for the storage, construction, assembly, transport and construction of OWTs.
- Demonstration and innovative OWF projects without auctions (research projects or projects with one W/T up to 20MW). If the installation of such projects takes place in areas where a Specific Frame of Development Terms for OWFs has not been approved, a limit on the total number of such projects exceeding 1MW must be placed.

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