



# ENERGY ISLANDS: TRANSFER OF COSTS THROUGH GRID CHARGES

Energinet stakeholder dialogue

October 26<sup>th</sup> 2022





# WHY ARE WE HERE?

- Engage in **dialogue on grid charge model** (tariff method) for offshore wind connected to the future Danish energy islands on Bornholm and in the North Sea
- Based on **political agreements on transferring net cost of transmission** assets to offshore wind and recent changes to the **Danish Energy Supply Act**.
- **Ready before procurement specifications** for Bornholm Energy Island is published (Q4 2023)

# GUIDELINES FOR OUR WORK

Within the **existing regulatory framework**, we seek a model that:

- Implies **low risk** for offshore wind developers when procurement specifications are published
- Follow the **same principles** as Energinets new **general tariff method** for production (connection fee + feed-in tariff)
- Can be used for **future energy islands** (North Sea) – potentially adjusted for learnings in the proces for Bornholm Energy Island



# TIMELINE AND PROCESS

To be ready in due time before DEA publishes procurement specifications for tenders for Bornholm Energy Island, Energinet will send a draft tariff methodology in public hearing in December.

## Tariff methodology – 2022-2023

### TODAY

Energinet presents main considerations for a tariff method for Energy Islands

### OCTOBER-NOVEMBER 2022

Energinet finalises a draft tariff methodology to send out in public hearing

### DECEMBER 2022

Energinet sends out the draft tariff methodology in public hearing

### JANUARY 2023

Energinet finalises the tariff method based on comments from the public hearing

### FEBRUARY 2023

The tariff method is sent to the Danish Utility Regulator for approval

## Tender process and connection – 2023-2030

### Q4 2023

Publication of contract notice – procurement specifications

### Q2 2024

Market conditions and EIA finish

### Q4 2024

Award of concession

### Q1 2029

POC ready

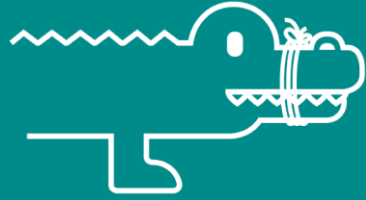
### DECEMBER 31, 2030

Full commissioning of the wind farm

# AGENDA

Time		Theme	Presenter
13.00-13.15	15 min	Welcome, purpose and agenda	Jeppe Danø, Energinet
13.15-13.25	10 min	Review on political agreements (new)	Rasmus Zink Sørensen, Danish Energy Agency
13.25-13.45	20 min	Regulatory framework for grid charges	David Hartz, Energinet
13.45-14.15	30 min	Outline of grid charges	David Hartz, Energinet
<i>14.15-14.30</i>	<i>15 min</i>	<i>BREAK</i>	
14.30-14.50	20 min	Determining the costs	Margrethe Langhoff Thuesen, Energinet
14.50-15.00	10 min	Payment method	Margrethe Langhoff Thuesen, Energinet
15.00-15.15	15 min	Conclusions and next steps	Jeppe Danø, Energinet





# MUTE

IF NOT SPEAKING



# RAISE A HAND

IF YOU WANT THE WORD



# PRESENT YOURSELF

NAME AND ORGANISATION



# QUESTIONS

ON THE WAY OR IN THE END  
OF EVERY SECTION



# MAKE A GOOD CUP OF COFFEE!



# REMEMBER TO SMILE 😊

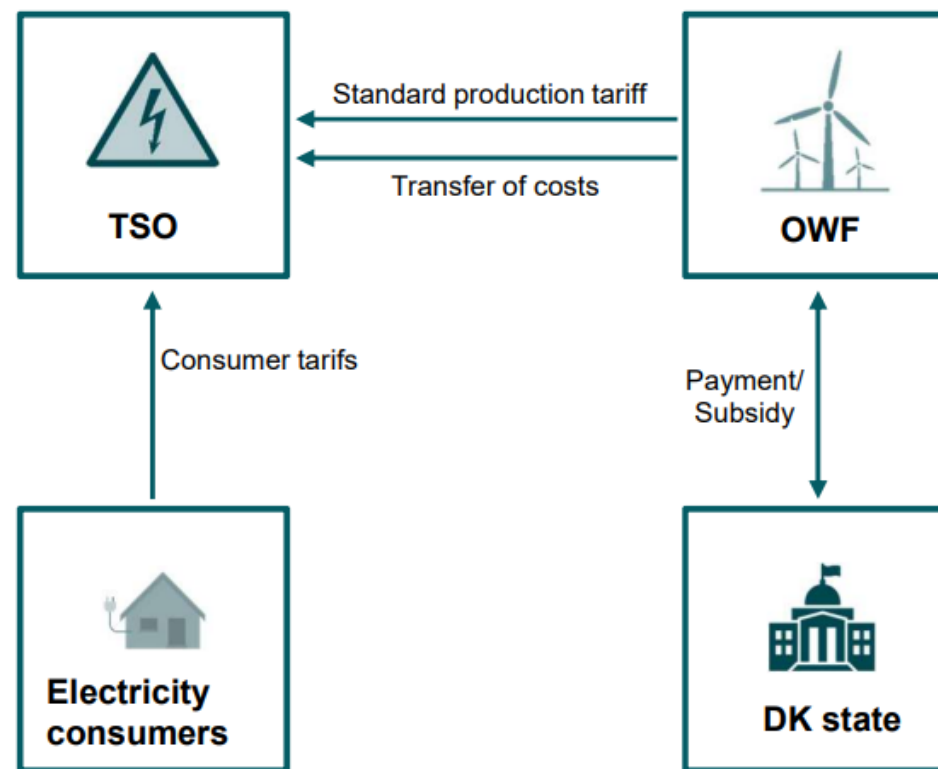
# REVIEW ON POLITICAL AGREEMENTS



# POLITICAL AGREEMENT

Political agreement of 1 September 2021:

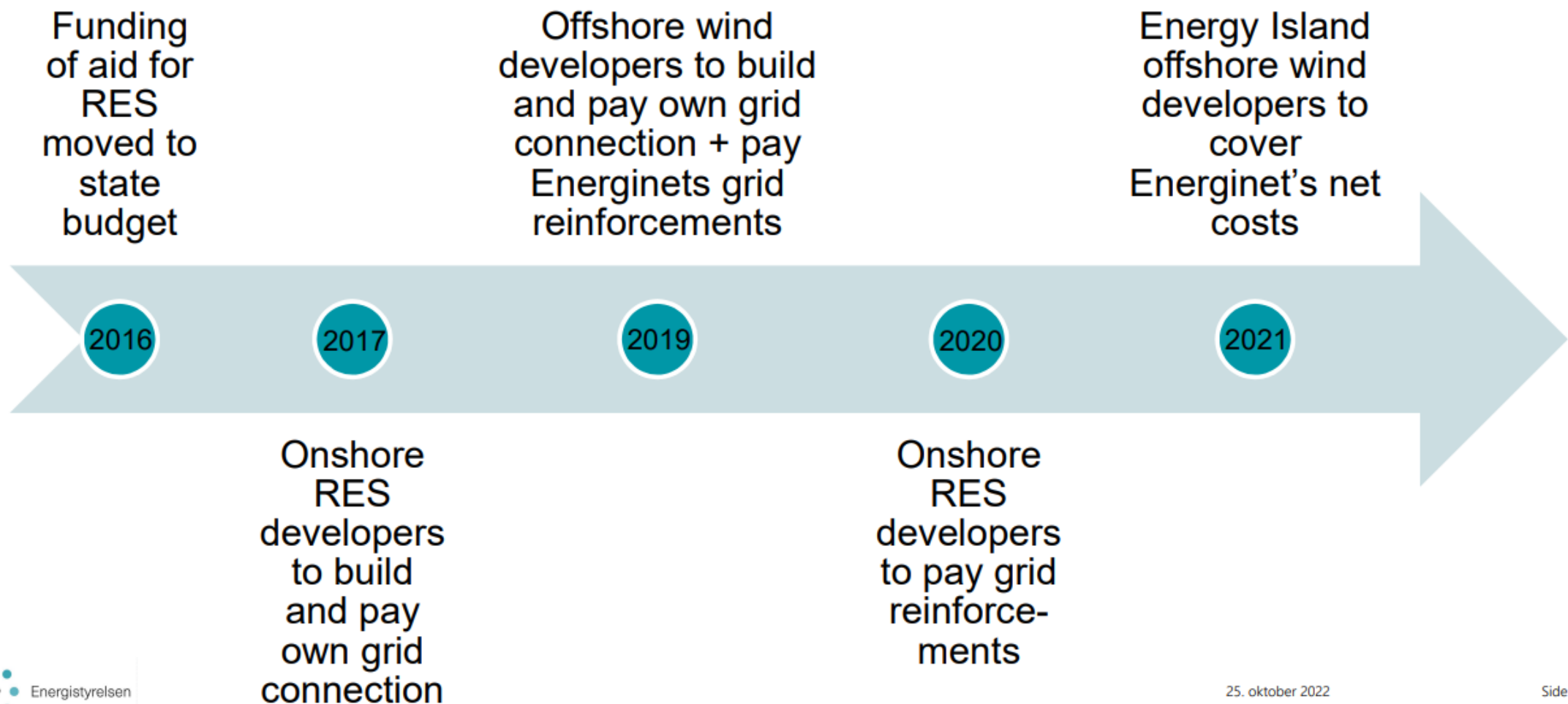
Energinet's net cost related to transmission infrastructure for the Energy Islands shall be transferred to the OWF-concessionaires to as great an extent as possible.







## FOLLOWS A TREND IN POLITICAL AGREEMENTS



# REGULATORY FRAMEWORK FOR GRID CHARGES

# DANISH UTILITY REGULATOR

All **methods** for calculating and invoicing grid charges must be approved by the Danish Utility Regulator

The Danish Utility Regulator evaluates and approves grid charging methods **strictly** in accordance with the **legal criterias** in EU and Danish regulation.



The Danish Utility Regulator **will also send out the proposal in public hearing.**

The Danish Utility Regulator can ask Energinet to **amend the proposed tariff method prior to approval.**

The tariff method will **not be valid until approval** is given.





# REGULATION ON INTERNAL MARKET FOR ENERGY

Regulation 943/2019 article 18 describes the principles for the tariff model.

**Charges** applied by network operators [...] shall be **cost-reflective**, **transparent**, take into account the need for network security and flexibility and reflect actual costs incurred insofar as they correspond to those of an efficient and structurally comparable network operator and are applied in a **non-discriminatory manner**.







# DANISH REGULATION ON ELECTRICITY SUPPLY

§ 73 describes the basic principles for all tariff models.

Charges for grid services (=access to as well as usage of the grid) shall be set according to **fair, objective, and non-discriminatory** criterias and **reflect the costs** which **the individual categories of grid users** give rise to.

Energinet will regard **OWF's at an energy island** as a **separate grid user category**.





# GENERATION CHARGES - CAP

Regulation 838/2010 sets out a cap for charges from producers/generation.

Annex – Part B

*(1) Annual average transmission charges paid by producers in each Member State shall be within the ranges set out in point 3.*

...

*(3) [...]*

*The value of the annual average transmission charges paid by producers in Denmark, Sweden and Finland shall be within a range of 0 to 1,2 EUR/MWh.*

# EXCEPTIONS FROM THE CAP IN 838/2010

For the calculation set out at Point 3, transmission charges shall exclude:

1. charges paid by producers for physical assets required for connection to the system or the upgrade of the connection;
2. charges paid by producers related to ancillary services;
3. specific system loss charges paid by producers.



# CONGESTION INCOME

An Energy Island will be connected on lines which will generate congestion income. It is therefore relevant to describe the rules governing the use of congestion income.

EU Regulation 943/2019 on the internal market for energy describes in article 19 how congestion income can be used

REGULATION (EU) 2019/943 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL  
of 5 June 2019  
on the internal market for electricity

Article 19

## Congestion income

2. The following objectives shall have priority with the respect to the allocation of any revenues resulting from the allocation of cross-zonal capacity:
- (a) guaranteeing the actual availability of the allocated capacity including firmness compensation; or
  - (b) maintaining or increasing cross-zonal capacities through optimisation of the usage of existing interconnectors by means of coordinated remedial actions, where applicable, or covering costs resulting from network investments that are relevant to reduce interconnector congestion.

3. Where the priority objectives set out in paragraph 2 have been adequately fulfilled, the revenues may be used as income to be taken into account by the regulatory authorities when approving the methodology for calculating network tariffs or fixing network tariffs, or both. The residual revenues shall be placed on a separate internal account line until such a time as it can be spent for the purposes set out in paragraph 2.



# CONGESTION INCOME

Article 19 (4) of regulation 943/2019 requires the TSOs to develop a methodology for use of congestion income.

- TSO's Proposal for use of Congestion Income Methodology was approved by ACER in Decision 38/2020.
- The methodology describes how the income can be used.
- It is also required that Energinet gets approval for its use of the actual income
  - Latest decisions from the Danish Utility Regulator
    - [Afgørelse om justering af Energinets anvendelse af flaskehalsindtægter i 2022](#)
    - [Afgørelsen om Energinets plan for anvendelse af flaskehalsindtægter i 2022](#)

REGULATION (EU) 2019/943 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL  
of 5 June 2019  
on the internal market for electricity

Article 19

Congestion income

4. The use of revenues in accordance with point (a) or (b) of paragraph 2 shall be subject to a methodology proposed by the transmission system operators after consulting regulatory authorities and relevant stakeholders and after approval by ACER. The transmission system operators shall submit the proposed methodology to ACER by 5 July 2020 and ACER shall decide on the proposed methodology within six months of receiving it.

**TSOs' proposal for the Use of Congestion Income  
Methodology in accordance with Article 19(4) of  
Regulation (EU) 2019/943 of the European  
Parliament and of the Council of 5 June 2019 on  
the internal market for electricity**

3 July 2020



# ENERGINET CONSIDERATIONS REGARDING CONGESTION INCOME

Future actual congestion income must be used in accordance with the EU regulation as well as the ACER approved methodology.

- The actual congestion revenue can only be used for the specific purposes listed in 943/2019, article 19, in accordance with Method for use of Congestion Income Methodology (as approved by ACER in Decision 38/2020).
  - Energinet's interpretation of the current regulatory framework is that it is not possible to allocate actual congestion income to an OWF.

Energinet will evaluate if the – *pending final design of tender by DEA as well as approval by Danish Utility Regulator* – relevant part of the NPV of estimated revenues from the connectors can be subtracted from the infrastructure costs, so that the OWF only shall cover the difference instead of the total infrastructure costs.

- Important note: The approved method for use of congestion income describes how parts of the congestion income can be allocated to a number of different cost categories, including system costs. It must be evaluated how this shall be taken into account when estimating if all or part of the NPV can be subtracted from the infrastructure costs.

COMMENTS OR  
QUESTIONS?



# OUTLINE OF GRID CHARGES (TARIFF MODEL)





# PURPOSE

The following topics will be presented in this section:

- Description of the **key methodological choices** that must be made regarding recovery of costs.
- Description of the **proposed model for grid charges**.



# KEY MODEL CHOICE

Should the connection fee be based on actual or budgeted costs?

**Actual costs** would be accurate in terms of cost reflectivity. However it will be uncertain at the time of the tender.

**Budget costs** can be fixed at the time of the tender leading to better visibility of costs for bidder. (However this leaves a risk for Energinet, the handling of which must be considered.)



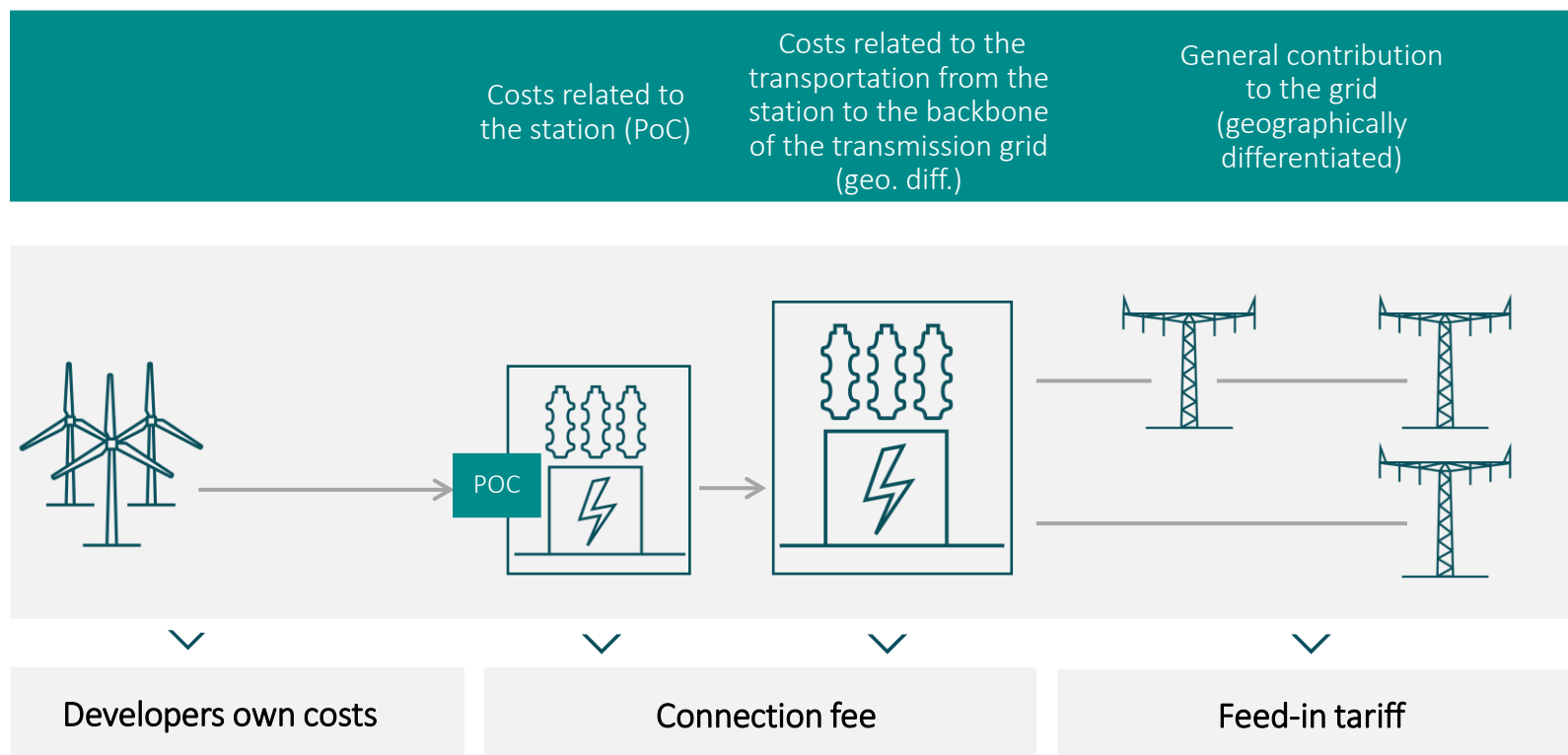
# TARIFF MODEL FOR ENERGY ISLANDS

- Energinet are aiming at developing a **generic model for energy islands**
- Energy Island **Bornholm** will be used in **the following part** of the presentation as it will be the first Energy Island
  - **learnings from Bornholm** could lead to **adjustments** in the model for the North Sea



# GENERAL TARIFF MODEL FOR PRODUCTION (NOT ENERGY ISLANDS)

This model is currently being processed by the Danish Utility Regulator and a decision is expected before end of 2022.



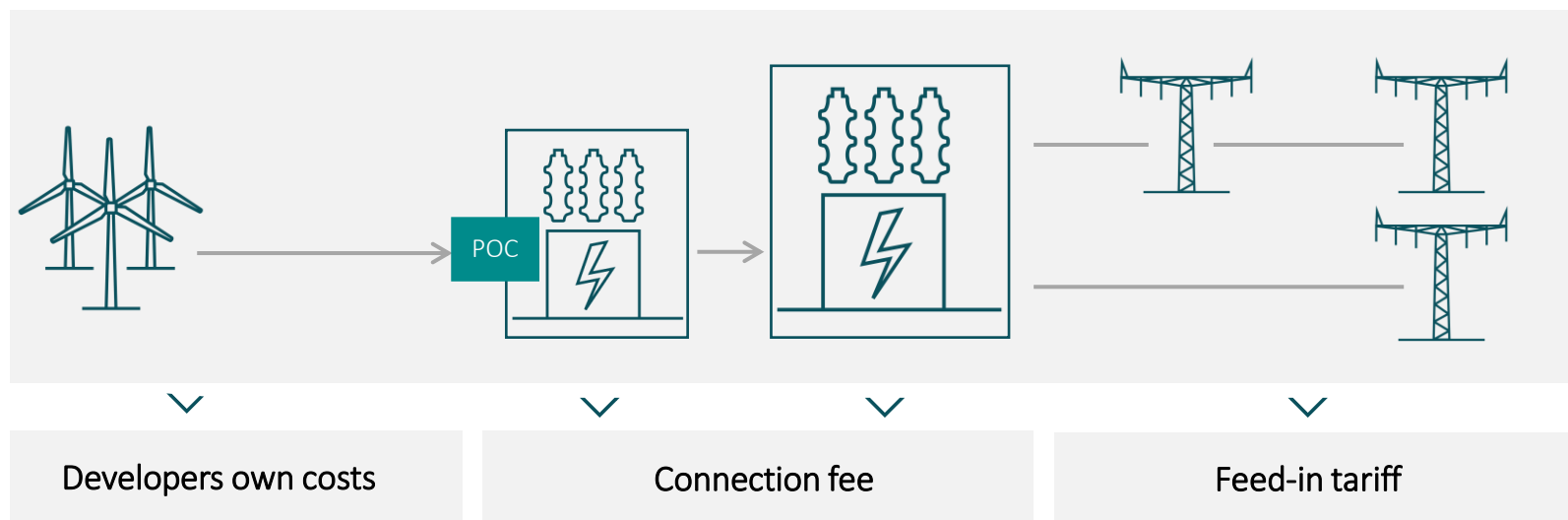
# APPLICATION OF THE SAME PRINCIPLES ON ENERGY ISLANDS

Energy Island

Station/facilities  
on Energy Island

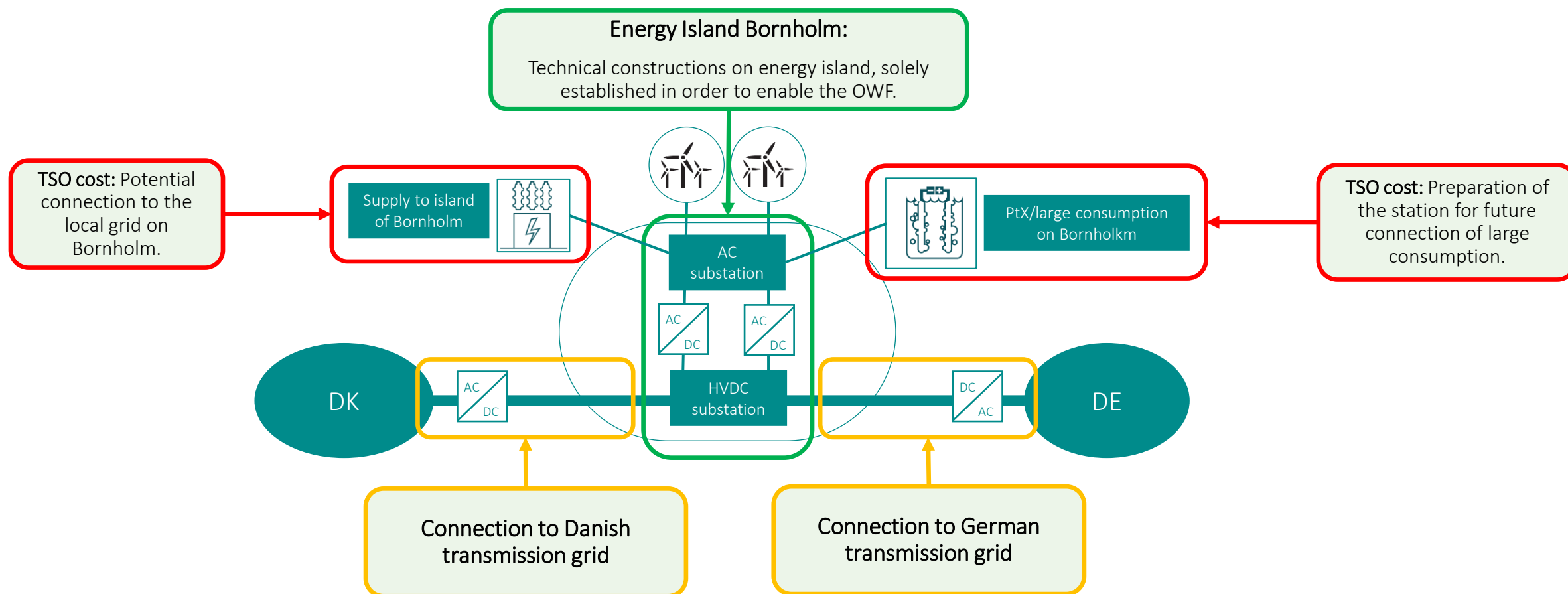
Connections to onshore  
transmission grid  
(for Bornholm DK2 and  
DE)

Regular feed-in tariff for  
production surplus  
areas





# SCHEMATIC DIAGRAM FOR ENERGY ISLANDS



# CONSIDERATIONS FOR TARIFF MODEL – CONNECTION FEE

Exclusion from the cap in Regulation (838/2010) Part B, 2(1):

*“charges paid by producers for physical assets required for connection to the system or the upgrade of the connection”*

## Connection to DK2

### Relevant costs:

All costs related to the connection to DK2.

÷ Allocation of NPV of estimated future income on the connection to be considered.

÷ EU-support.

= Total sum of costs.

## Energinet station Bornholm

### Relevant costs:

All costs required for the station.

÷ Costs potentially covered by a neighbor-TSO

÷ Costs not required for the production facility

÷ EU-support.

= Total sum of costs.

## Connection to DE

### Relevant costs:

All costs related to the connection to DE.

÷ Costs covered by neighbor-TSO.

÷ Allocation of NPV of estimated future income on the connection to be considered.

÷ EU-support.

= Total sum of costs.

# FEED-IN TARIFFS: GEOGRAPHICAL DIFFERENTIATION

The map illustrates the differentiation currently awaiting approval from the Danish Energy Regulator.

- Blue areas – Production surplus areas:
  - 9 DKK/MWh – feed-in tariff
- Beige areas - Consumption dominated areas:
  - 3 DKK/MWh – feed-in tariff

For Energy Islands we expect to categorise the area in which they are connected as a production surplus area, hence the tariff will be:

- 9 DKK/MWh – feed-in tariff



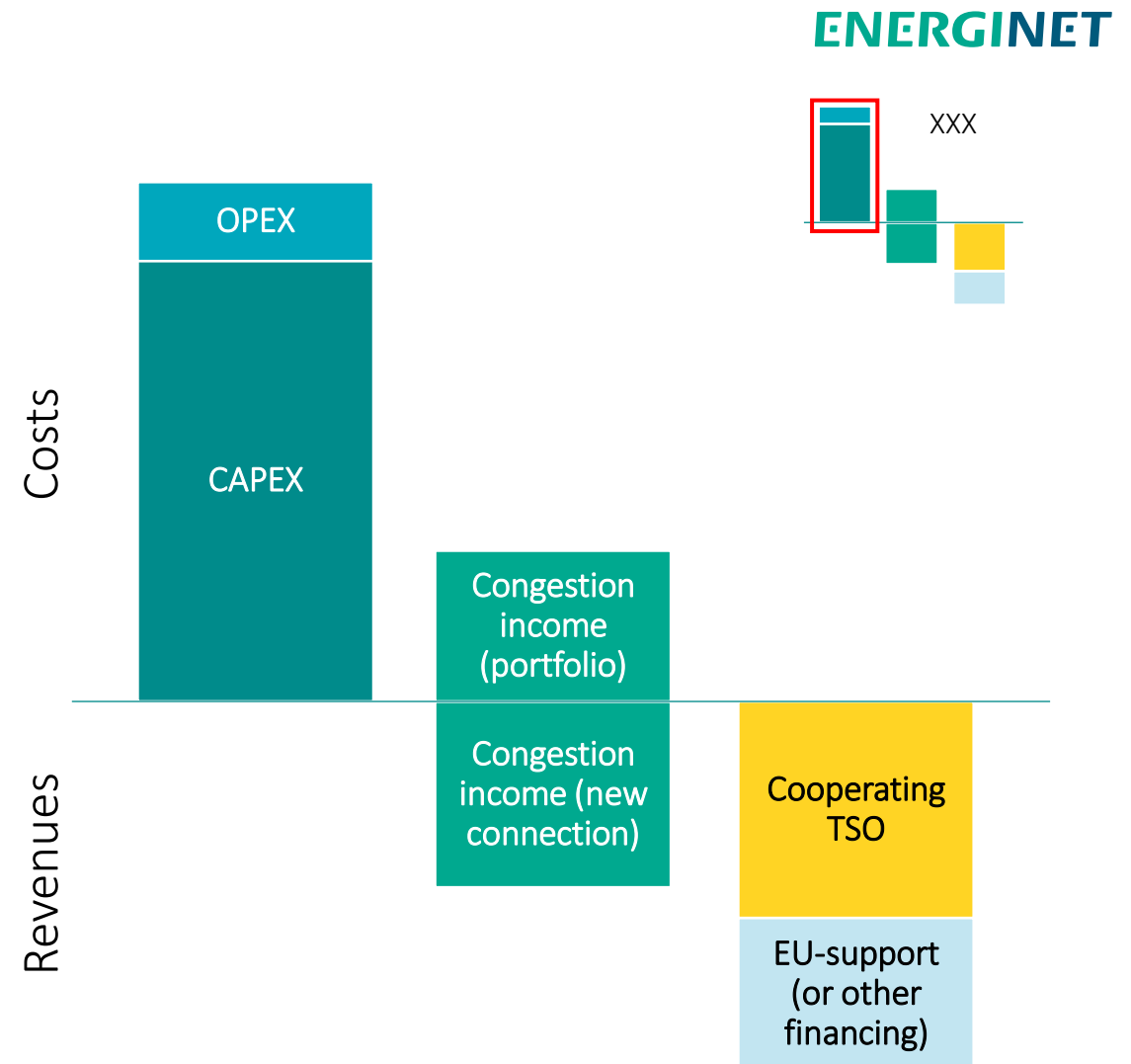
COMMENTS OR  
QUESTIONS?





# DETERMINING THE COSTS

# OVERVIEW OF KEY COST AND REVENUE ELEMENTS



*Dimensions in the figure are only illustrative and not based on estimated values*



# CAPEX, OPEX AND COOPERATION TSO

- CAPEX, OPEX and contribution from cooperation TSO can be (re)estimated as input to the Danish Energy Agency (DEA) before procurement specifications is published
- OPEX is (partly) covered by feed-in tariff – do not contribute to calculation of the connection fee





# EU SUPPORT

## – APPROACH TO BE DECIDED

- Energinet expect to **apply for EU support** for the energy island projects
- **How to handle** financing from EU (or other external financing)?
- **Different models** could be considered:
  - Central estimate or zero estimate?
  - Should the connection fee be adjusted for actual EU support?
- Other models?
- Any preferences?

### Model A:

No estimate included  
Connection fee adjusted  
→ potential upside for wind developers

### Model B:

Central estimate included  
Connection fee adjusted  
→ risk (up- and downside) for wind developers

### Model C:

Central estimate included  
Connection fee not adjusted  
→ no risk (or upside) on wind developers

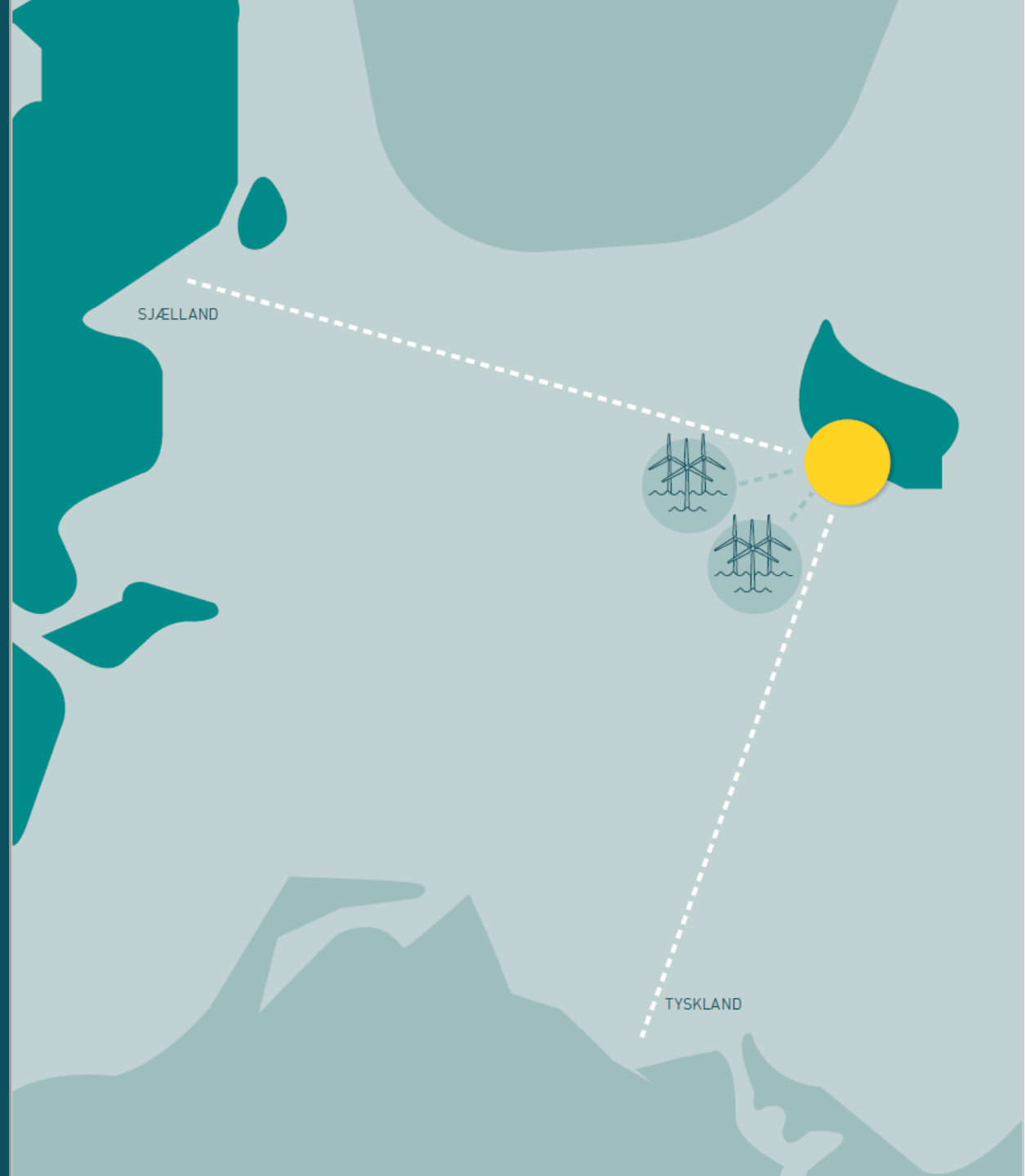
Other models?





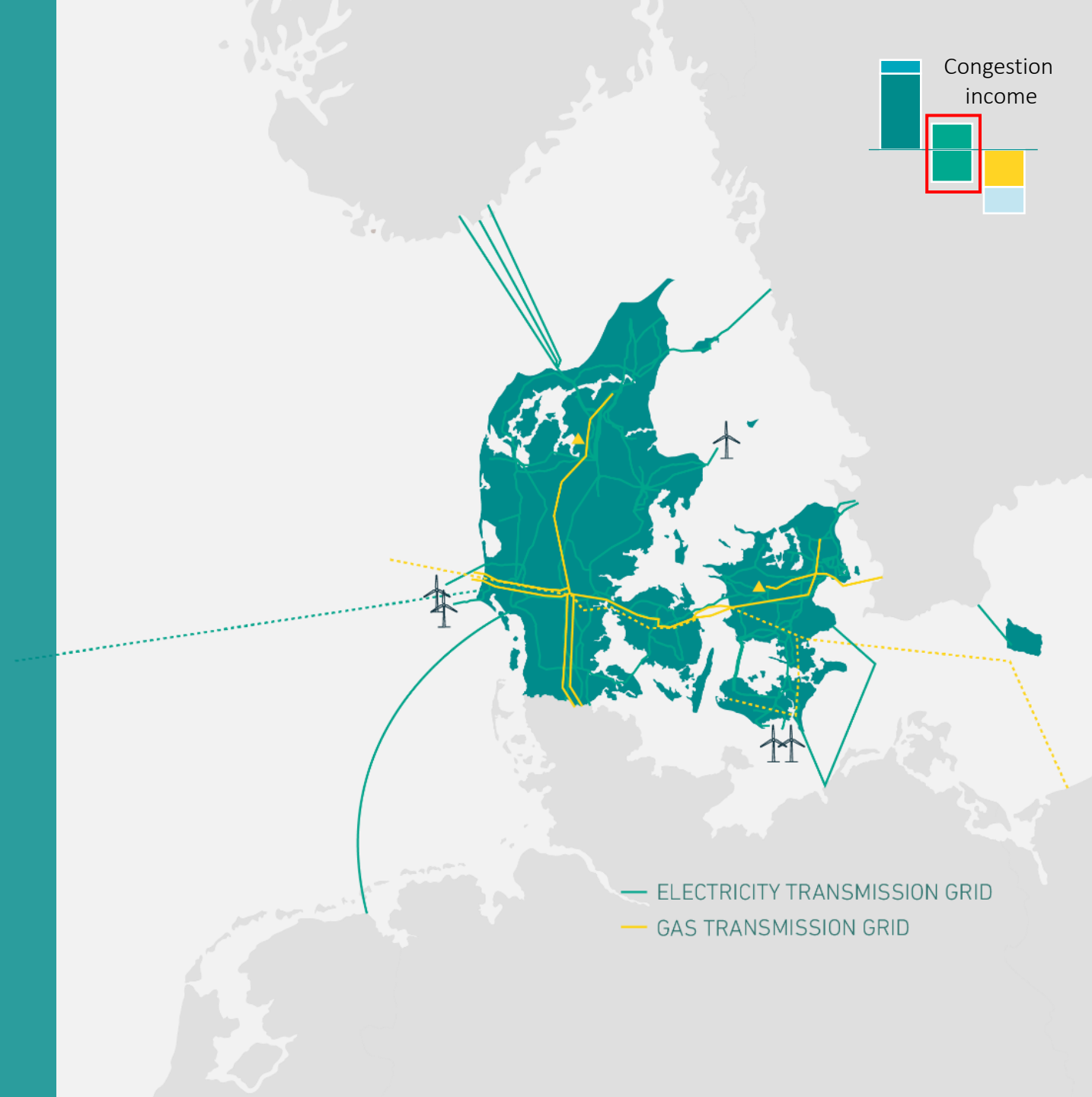
# CONGESTION INCOME – LIMITATIONS AND CHOICES

- Energinets interpretation of EU regulation is that **only estimated congestion income** (not actual) can possibly reduce payments from offshore wind developers
- This leaves us with two primary questions:
  - A. **Scope of effects** on congestion income?
  - B. **How to estimate** the effect (process, models, input data etc.)?



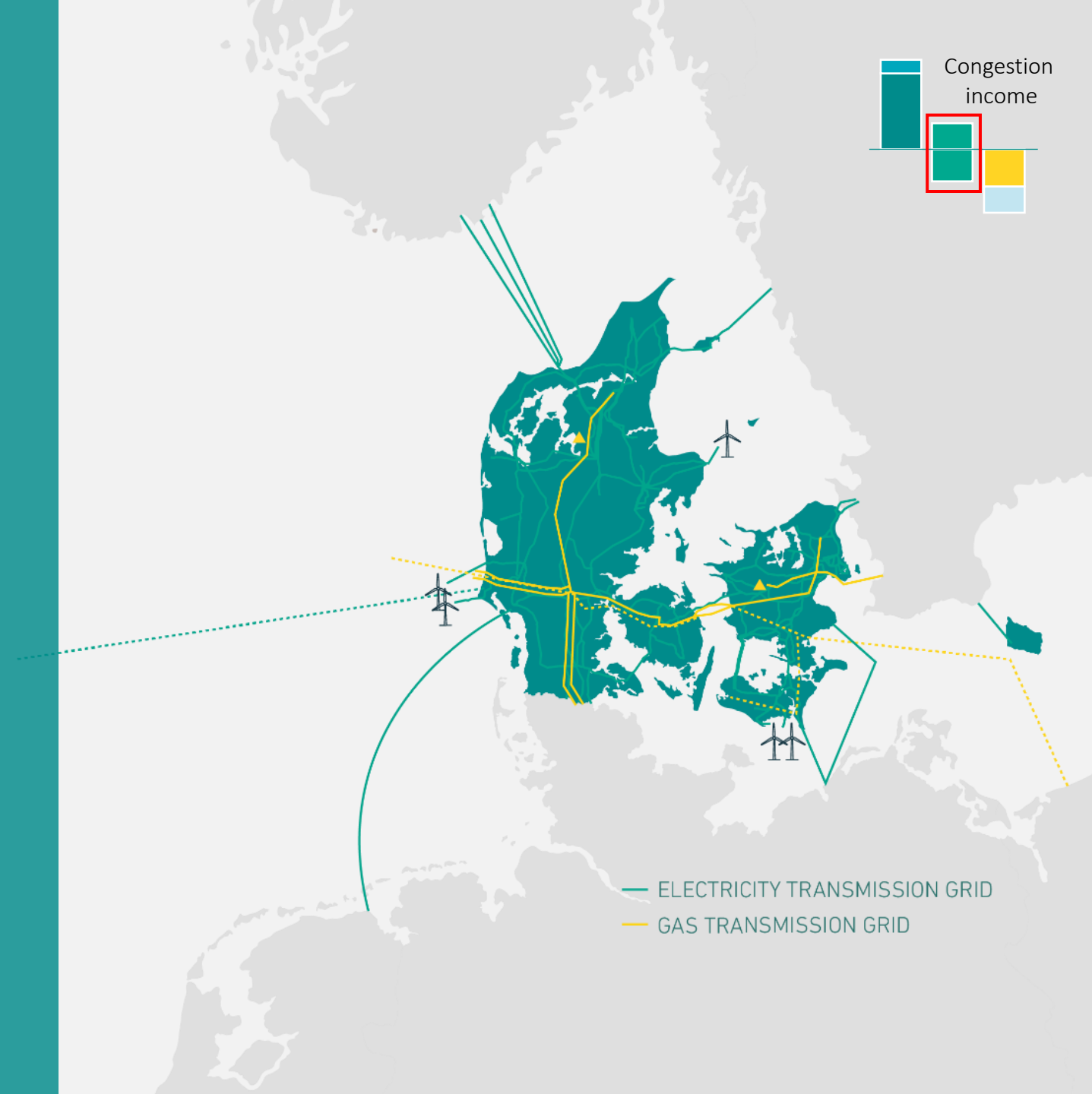
## A: SCOPE OF EFFECT ON CONGESTION INCOME?

- Establishing new infrastructure will **impact the entire energy system** and congestion income for **both the new and existing interconnectors** (portfolio effects)
- Energinet suggest to use the **net effect on congestion income** – this means incl. portfolio effects on Energinet's existing connections



## B: HOW TO ESTIMATE THE EFFECT?

- Congestion income is estimated as at part of **Energinets business case** for new transmission infrastructure
- The effect is estimated by comparing congestion income in **scenarios with and without the new infrastructure** to be established
- For **Bornholm Energy Island** the estimates currently indicate that the **impact on congestion income is limited and insufficient to cover the cost of the infrastructure**





## DATA



### Results rely on various data input

Assumptions on the **Danish energy** system is based on **Analyseforudsætningerne**.

Assumptions on the **European energy** system is based on **ENTSO-E ERAA and TYNDP**.

Input data includes production capacity, consumption, interconnector capacity, Fuel prices, carbon prices, technical specifications on production units.



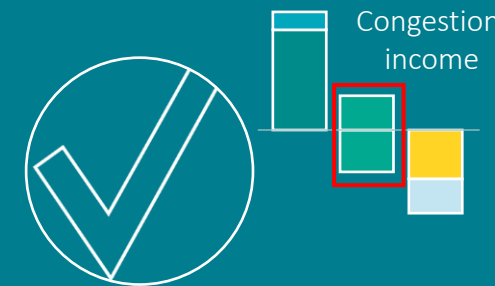
## ENERGY SYSTEM SIMULATIONS



### And various simulations

Simulations are done in the **BID3 modelling tool** – AFRY's electricity marked dispatch model.

The market simulations are carried out for the **European energy system**.



## RESULTS

### Output

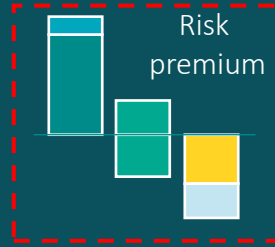
Results are on **hourly** basis and include:

- Socioeconomic indicators such as producer and consumer surplus and **congestion rent**.
- Electricity prices and flows
- Production (curtailment) and consumption.
- Emissions



# RISK PREMIUM

## – APPROACH TO BE DECIDED



- In **principle**, offshore wind farms should pay the **actual cost** of connection
- In reality, and if the connection fee is based on **expected cost and revenues**, consumers (or the Danish State) will bear a **risk related to the actual cost and revenues**
- In this case we need to **estimate a risk premium** as a part of the connection fee
- **Further analyses** is needed on the approach to determine a risk premium



# WHAT DO THE NUMBERS FOR BORNHOLM COVER?

Several numbers have been mentioned regarding Bornholm Energy Island. This slide explains how the numbers are linked.

Energinet's CAPEX related to Bornholm Energy Island (3GW) is estimated to DKK 16.9 bn<sup>1</sup> and consists of:

- Plants and converters on Bornholm Energy Island
- Plants and converters on Zealand (DK2)
- Land and sea cables from Bornholm Energy Island to DK2
- Project cost
- Risk premium

The **connection fee** covers the **net present value** of Energinet's capital expenditures related to Bornholm Energy Island (3GW). The connection fee depends on the CAPEX estimate and the specific parameters applied, e.g. discounting rates.

**If the connection fee is paid as a one-off payment:**  
Approx. DKK 19 bn (2022 price level) paid in 2031.

**If the connection fee is paid in annual instalments:**  
Approx. DKK 1 bn (2022 price level) paid each year from 2031 to 2060.

It is yet to be determined whether a model with annual instalments is possible within the regulatory framework.

Depending on a TSO agreement with 50 Hertz, Energinet's CAPEX may be reduced.

In a letter from the Danish Minister of Climate, Energy and Utilities<sup>1</sup>, Energinet's CAPEX is estimated to be reduced to DKK 13.9 bn.

The **feed-in tariff on DKK 9/MWh** is paid in addition to the connection fee.

Given a production of 4,600 full-load hours and a capacity of 3GW, the **yearly feed-in tariff** will be **approx. DKK 124 mill.**



COMMENTS OR  
QUESTIONS?



# PAYMENT METHOD

For the connection fee

# UP FRONT OR ANNUAL PAYMENT?

- Market dialogue: Indication of a connection fee payed as a **fixed annual fee** (eg. XX bn DKK over 30 years)\*
- Alternatively, the connection fee could be a **one-off payment** in year of connection
- Any preferences?

\*It is yet to be determined whether a model with a fixed annual fee is possible within the regulatory framework



Up front payment	Annual payment
<ul style="list-style-type: none"><li>+ Potential large on-off payment for offshore wind developers</li><li>÷ Low/no bankruptcy risk for payments to Energinet</li></ul>	<ul style="list-style-type: none"><li>÷ Payments follow earnings over lifespan for offshore wind developers</li><li>+ Bankruptcy risk for payments to Energinet</li></ul>



# CONCLUSIONS AND NEXT STEPS

# PROCESS – TIMELINE FOR TARIFF METHOD

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## How you can you interact with Energinet in the proces?

- Follow-up from today
  - 1:1 meetings
  - Written feedback on presentation
- Public hearing process
  - Written feedback
- Additional open meetings?
- Other?