TEASIMED OUTPUT

ACTIVITY 3.1 “EXECUTING SHORT-TERM DEMONSTRATION PROJECTS IN THE MAGHREB”

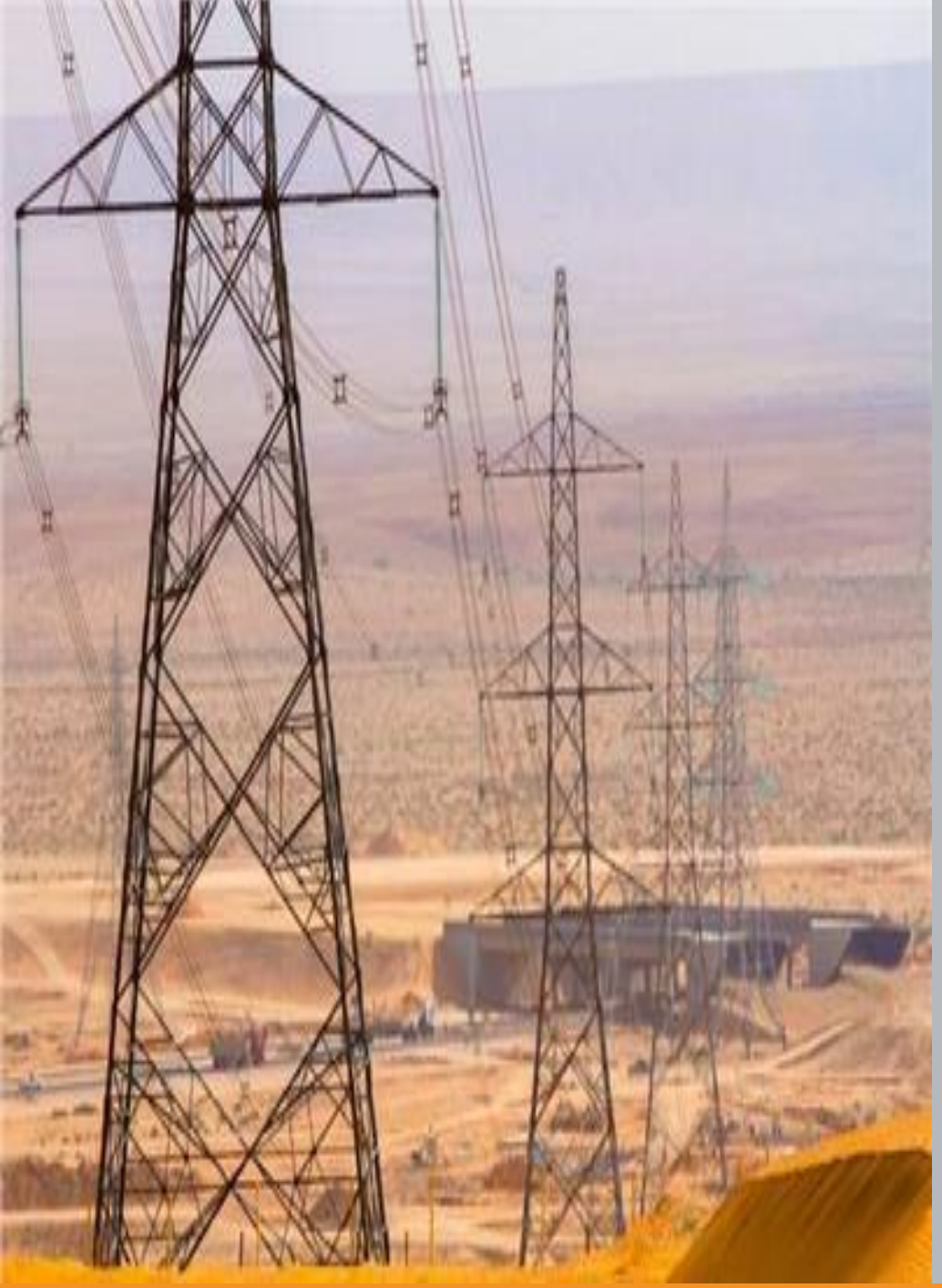
14 May 2024, Dammam, 2nd knowledge sharing workshop

Pan Arab Electricity Market

Med-TSO

TeasiMed2 project

Co-funded by
the European Union



Agenda

1. **Objective of the project & Tentative Road Map**
2. Preferred Market Model
3. Current status (TEASIMED (2020– 2022))
4. PHASE 1
5. PHASE 2
6. PHASE 3
7. Implementation Roadmap

Objectives of the Project

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Teasimed2 project

Teasimed
TOWARDS AN EFFICIENT, ADEQUATE, SUSTAINABLE AND INTERCONNECTED MEDITERRANEAN POWER SYSTEM

Towards an **E**fficient, **A**dequate, **S**ustainable and **I**nterconnected **MED**iterranean power system

↓

"Identification and put into operation of the selected Interconnected Electricity Exchange Zones

↓

"Executing short-term demonstration projects in the Maghreb"

↓

Project: "Benchmarking and proposal of minimum requirements for the proper functioning of Maghreb electricity exchange zone and the development of trade platform"

- The **main objective** is to **define** and **assess different options** to allow trading of electricity between the countries within the Maghreb Area.
- The creation of **a trade platform** will establish an **operational and legal framework** for commercial exchange of electricity in order to:
  1. Use the interconnection capacity in an optimal way
  2. Optimize the generation cost of electricity in the region
  3. Facilitate the integration of renewables
- The trade platform proposition shall be implemented step by step considering local constraints

Tentative Road Map towards a zonal platform for power trading

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TeasiMed2 project

Creation of a dedicated Project Team (Multi-skill team)

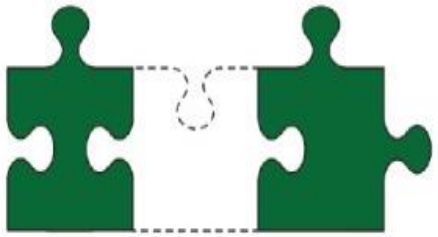
Inception Phase

Benchmarking on similar cases

Analysis of the status of regulatory framework in Maghreb countries

Definition of cooperation principles

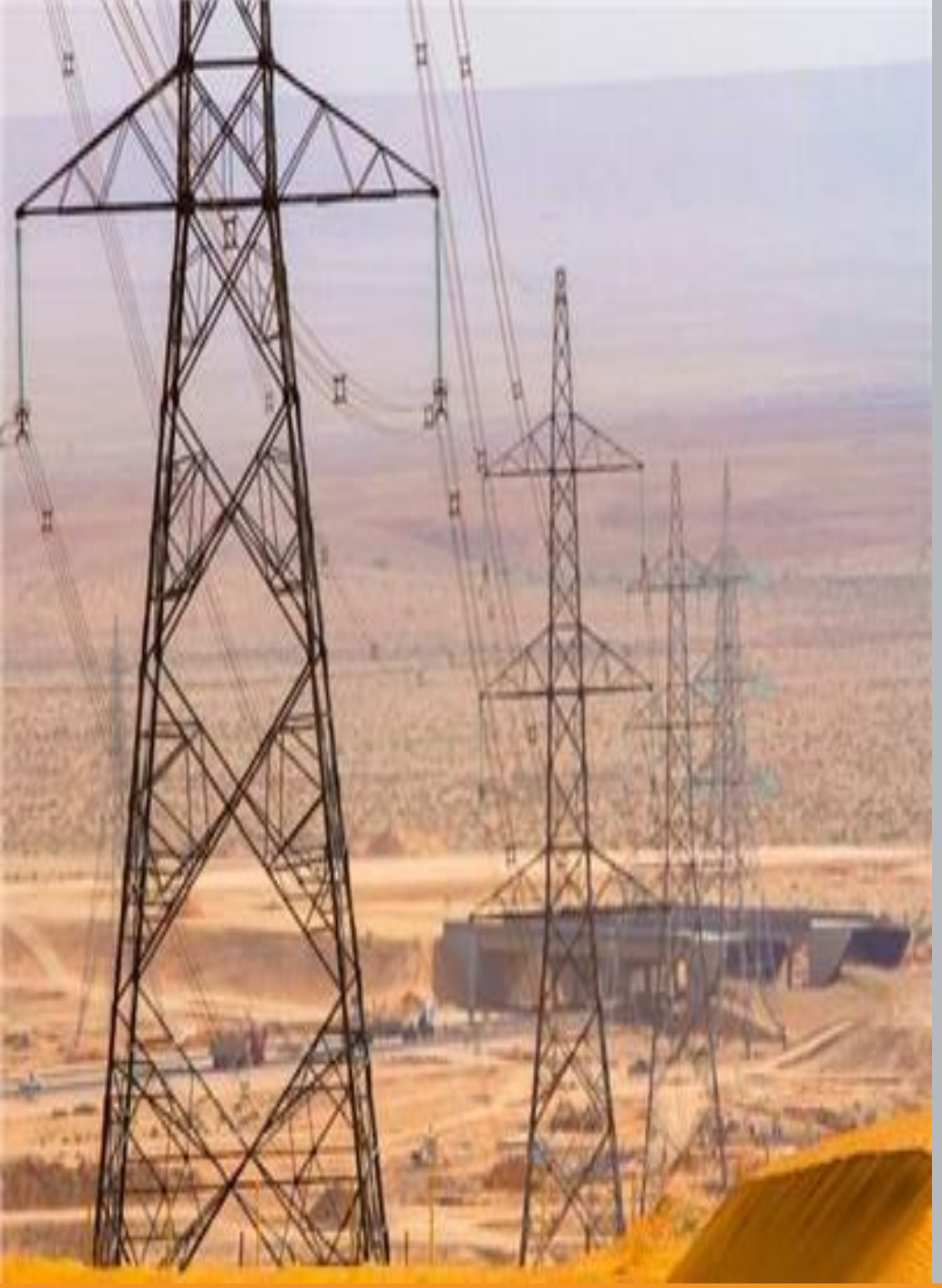
Determining minimum requirements for the proper functioning of power exchanges



Gap analysis and action plan for filling the gap

Developing and establishing the Agreement

INSTITUTIONAL ENGAGEMENT IS NEEDED



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Preferred Market Model:

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The objective is to propose a market model that would be fit with actual constraints and future developments

Design pieces

	Phase 1	Phase 2	Phase 3
1. Participants	Inter TSOs		TSOs, IPPs
2. Products	Daily Market		
3. Cross border Capacity allocation	Bilateral agreements	Implicit cross border capacity allocation	
4. Price determination	Pre-determined price	Auctions	
5. Market Organization	Bilateral	Trilateral	Independent market operator
6. Settlement and nominations	Bilateral	Trilateral	Independent market operator

This Model can be applied to South Eastern Mediterranean

Reports for the Interconnected Electricity Exchange Zones (IEEZ) (pilot project of Maghrib Region):

https://med-tso.org/wp-content/uploads/2023/05/Executing-short-term-demonstration-project-in-the-Maghreb-Region.pdf

https://med-tso.org/wp-content/uploads/2023/05/Integrating-the-power-markets-in-the-south-west-Mediterranean.pdf

General description of the Trading Design Phases

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Phase 1
Pre-definition of Prices

Key Elements:

- Improving existing bilateral cross-border trading between Maghreb TSOs via enhanced process of pre-defined price
- Operators adapting their prices to the market and the situation of the grid
- Increasing operators' autonomy to define best transaction prices

it is recommended to fix price boundaries in the bilateral agreements to allow flexible price range

Phase 2
Cross-border Trading Design

Key Elements:

- Deploying trilateral trading auction to optimize the needs and offers of the three TSOs together with the cross-border constraints
- Organizing a single trading platform
- Opening up the pre-defined price principle to daily auctions for TSOs where each TSO builds a daily order book
- Optimizing the order books in an auction considering the cross-border constraints, creating an implicit allocation of cross-border rights to make the most of the exchange possibilities between the three countries

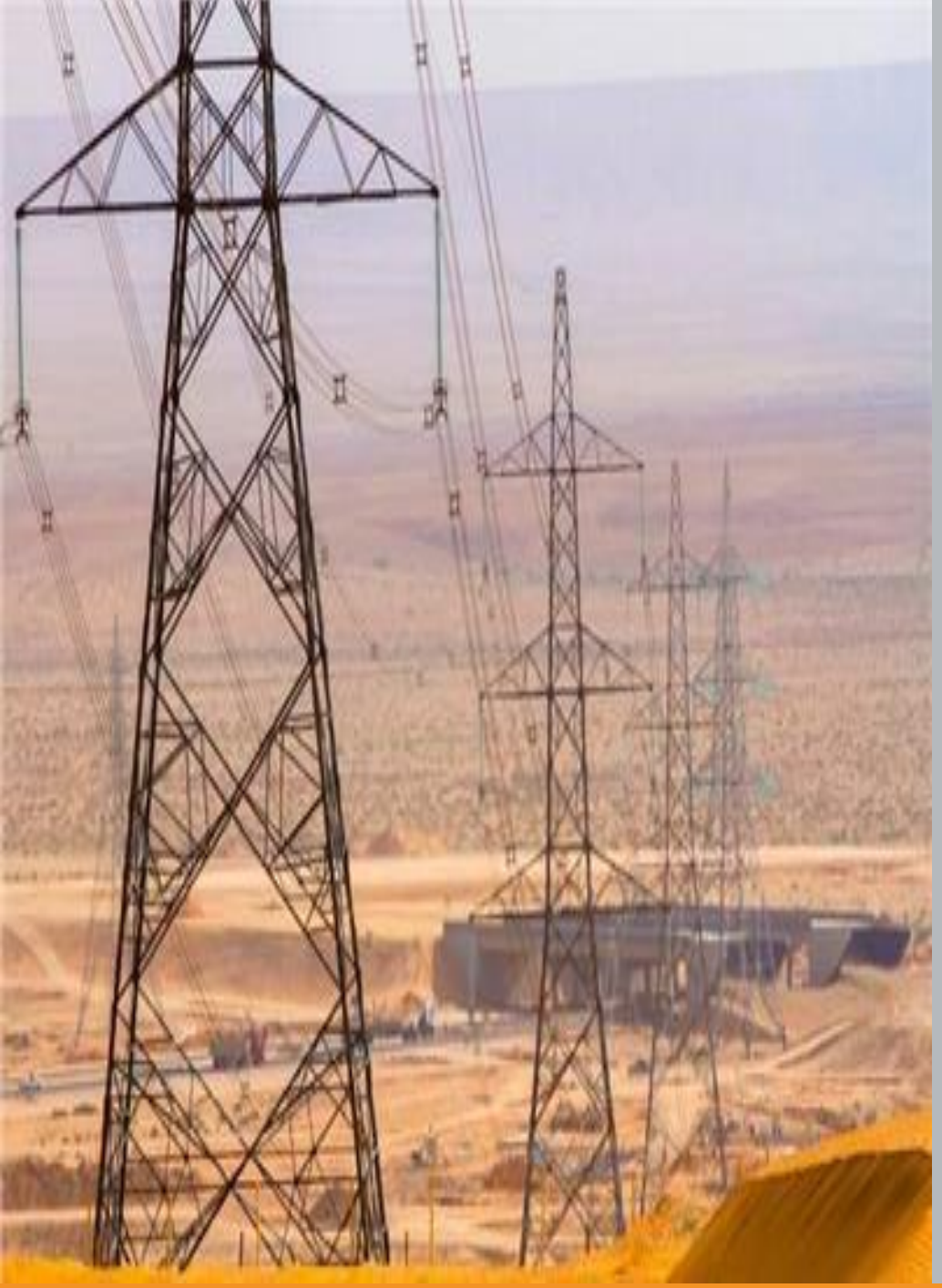
The best approach, if the trading processes should be opened for additional countries, is to allow them to join a predetermined design and governance, from a bottom-up approach, and if the existing members of the market coupling do agree.

Phase 3
Independent Market Operator

Key Elements:

- Opening the implicit cross-border auction market to additional participants in at least one of the three countries
- Introducing an independent market operator with all the processes and market rules to onboard new cross-border market participants from at least one country
- The independent market operator organizing the market neutrally with standard procedures, will allow new parties access to the wholesale power market

Phase 3 is not mandatory to be reached by all three countries simultaneously



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South Western Mediterranean: use of interconnections

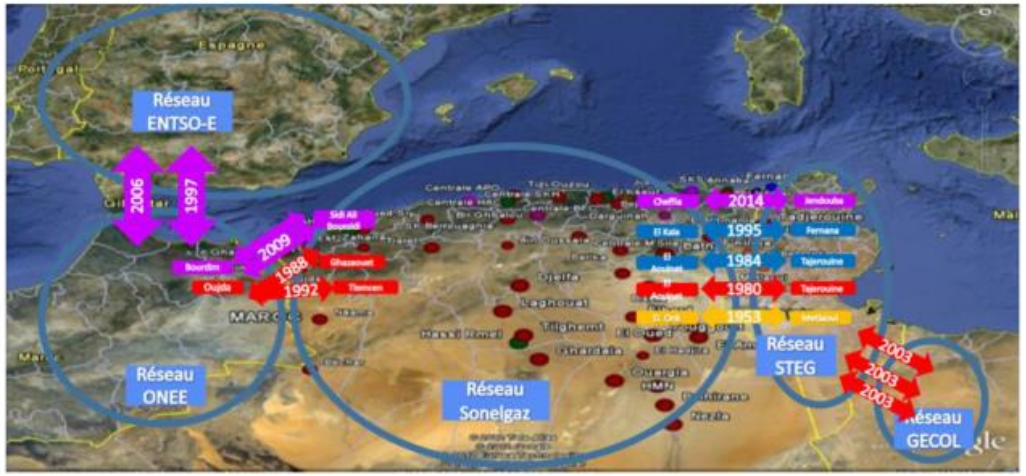
Commercial Cross-border trades between Maghreb countries are based on bilateral agreements:

- General capacities fixed in these frameworks and not updated closer to real time to consider latest grid configuration.
- Prices revised periodically (every 3 to 6 months);
- Trades are triggered by countries who need additional supply (demand based)
- Trades confirmed by phone, usually in day ahead based on technical feasible
- No regional coordination yet

Interconnections are also used for emergency support

- Energy exchanges limited in time and volume and compensated in kind

INTERCONNEXION	LIAISON	TENSION (kV)	CAPACITE DE TRANSIT (MW)
ESPAGNE-MAROC	Puerto de la Cruz-Melloussa	400	2 x 700
MAROC- ALGERIE	OUJDA-GHAZAOUT	220	250
	OUJDA - TLEMCEN	220	250
	BOURDIM - SIDI ALI BOUSSIDI 1 et 2	400	2x1200
ALGERIE-TUNISIE	CHEFFIA-JENDOUBA	400	1200
	EL AOUINET - TAJAROUINE	220	240
	DJ. ONK - METLAOUI	150	160
	EL KALA-FERNANA	90	80
	EL AOUINET - TAJAROUINE	90	80

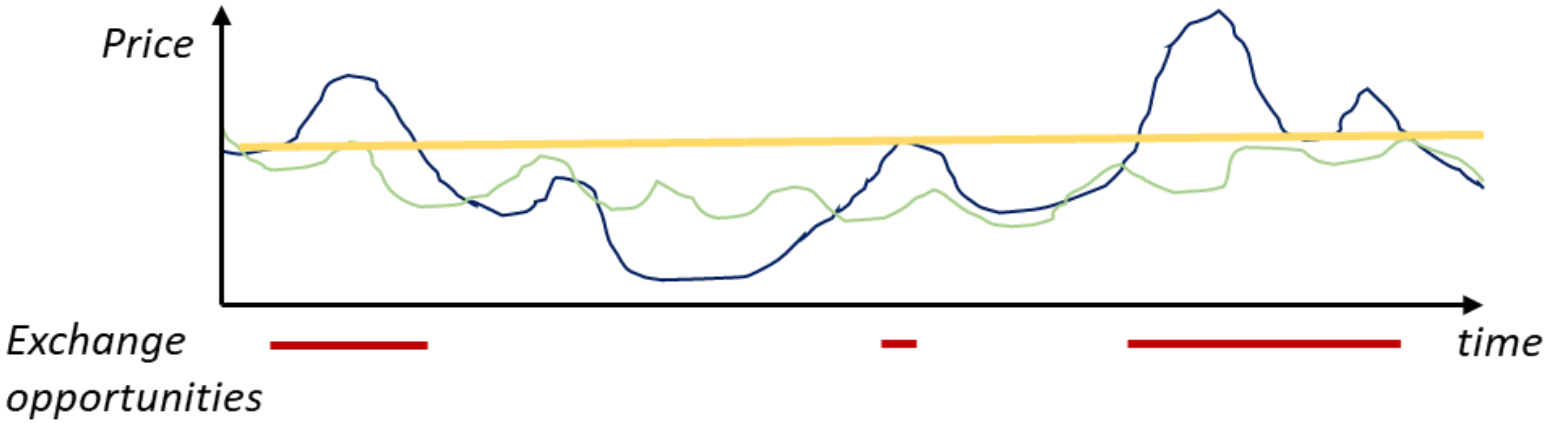


South Western Mediterranean: Access of Independent power producers

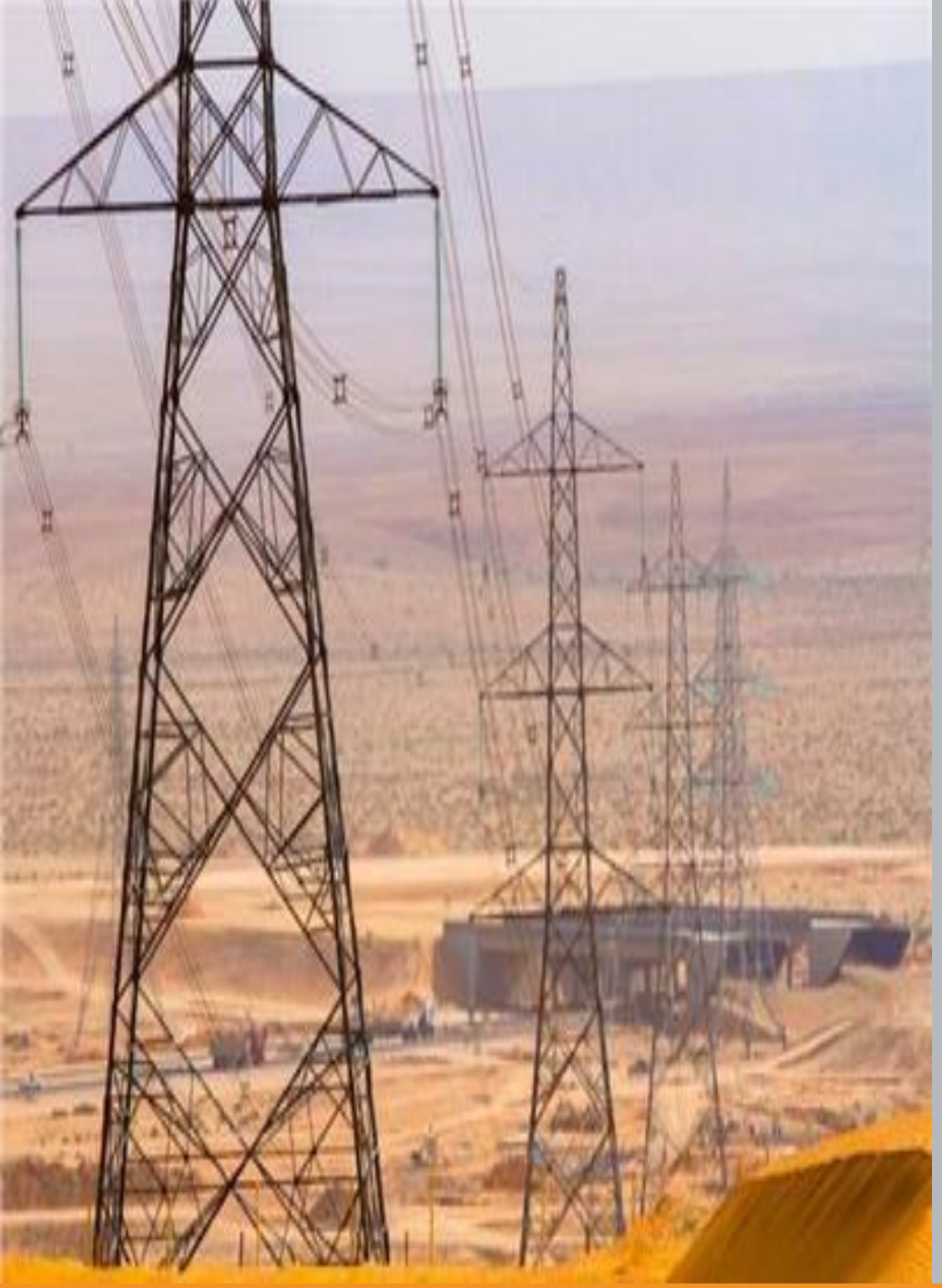
	Morocco	Algeria	Tunisia
Are independent power producers (IPPs) authorized ?	**Yes** On both transmission & distribution networks	**Yes** Only for transmission network (HV). Regulatory framework missing for MV production	**Yes**
Can IPPs export produced electricity ?	**Yes** (law 13-09 of 2010)	**Yes** (law 02-01 of 2002, art. 85 to 87)	**Yes** (law 2015-12)
What are the conditions for IPPs to export ?	▪ Bilateral contracts with negotiated prices (including access tariffs). ▪ ANRE is informed of these conventions.	▪ Bilateral contracts with negotiated prices ▪ Operational conditions for import / export are approved by regulator to ensure transparent access to electricity markets.	▪ Bilateral contract (covering operational, financial and commercial conditions) with STEG in case of use of national network ▪ Need to get a concession (granted by the state, following competitive process) ▪ Part of production is granted to the state
Who supervises ?	ANRE + Energy Ministry	CREG + Energy Ministry	Energy Ministry

- **Independent power producers** exist in each national energy market and may export electricity (if production is based on RES)
- There are **entry barriers** that may limit competition in the context of a regional and integrated market.
- **Harmonization** is therefore a pre-requisite to the setup of competitive regional electricity market.

Bilateral Contracts with fixed prices for the commercial exchange



Legend:
- Buyer price
- Seller price
- Fixed price
- Time windows when some exchanges are possible if the price is fixed



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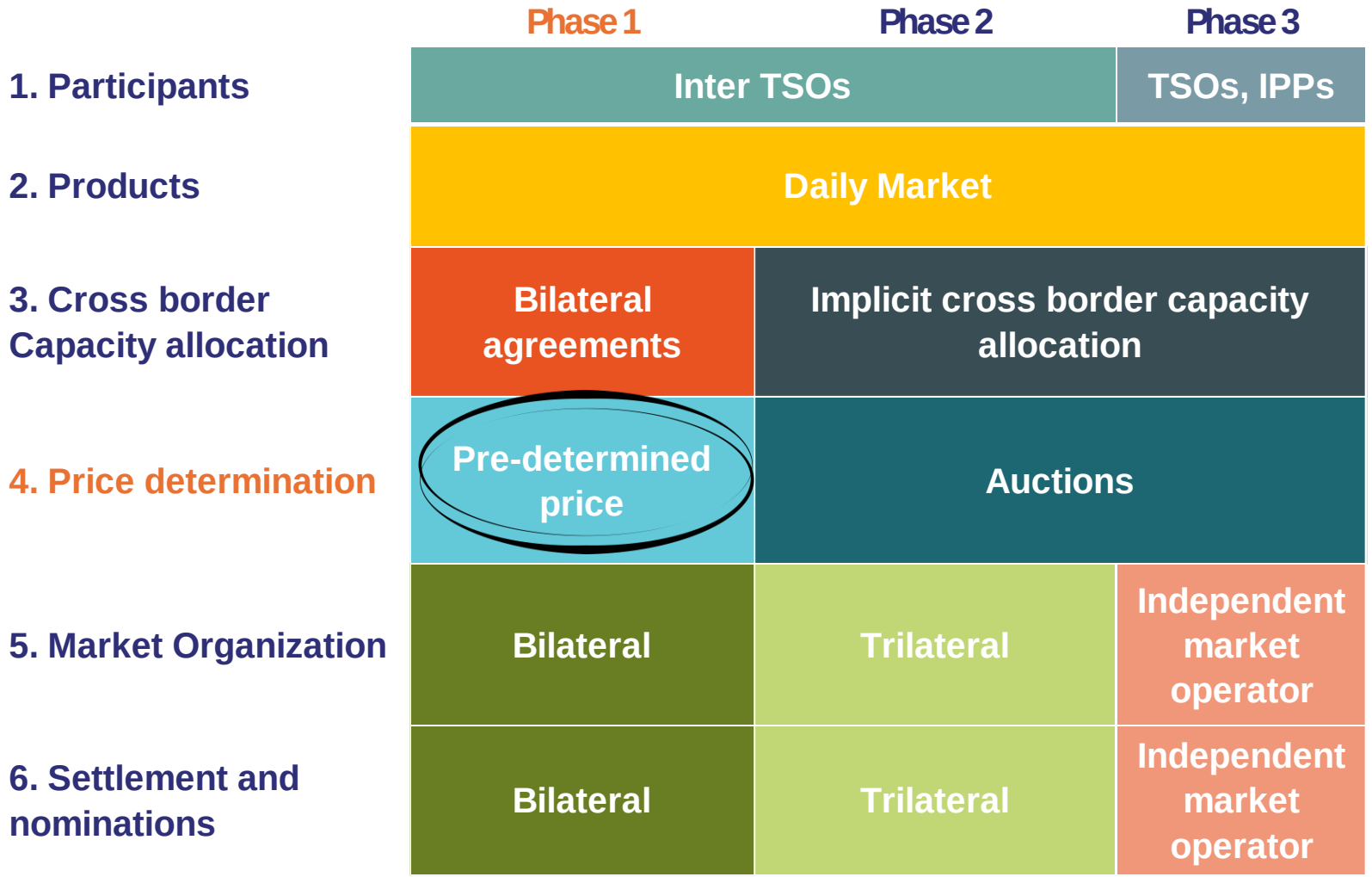
Phase 1: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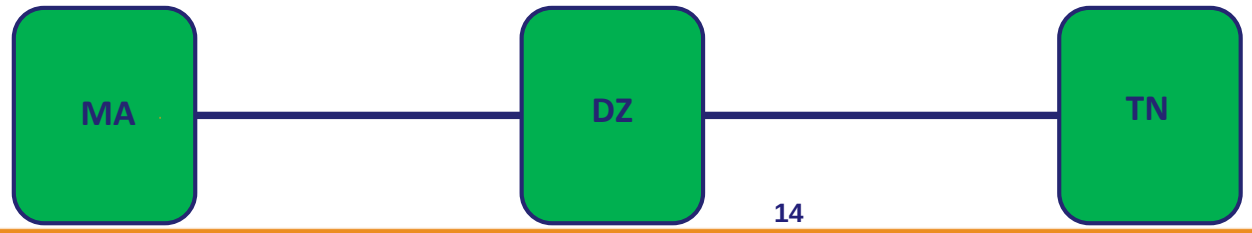
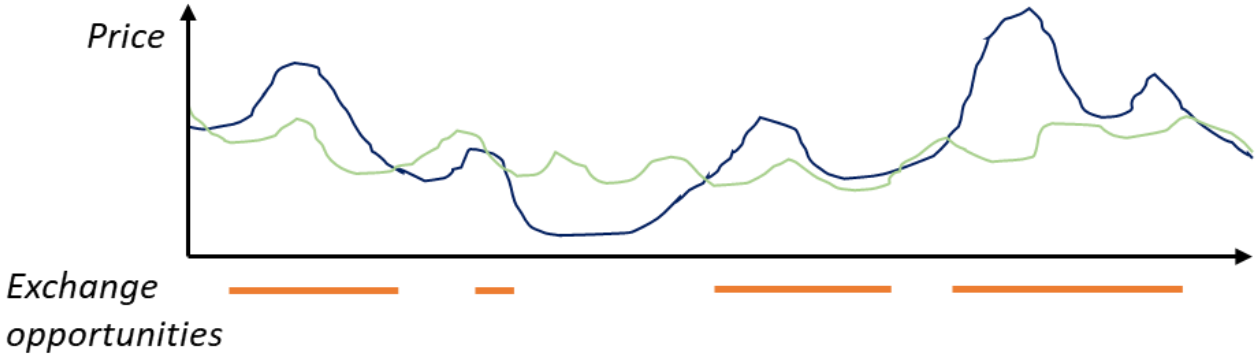
The Proposal : HOW?

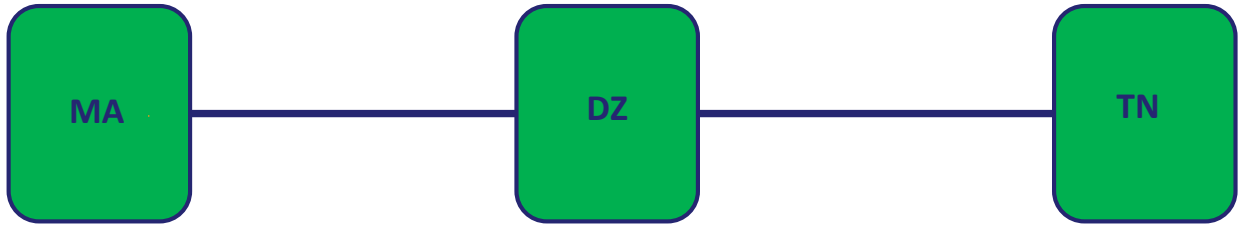
- Bilateral **Contracts** should evolve, including common **pre-defined price range instead of one fixed price for the next months**
- Prices could be different **per hour of the day**, and a different price could be proposed for the deals done in the day-ahead and intraday timeframe.
- The framework contracts would keep on fixing the maximum volume of each transaction.
- Each TSO would set up internal **rules** to be followed by the operators when offering or accepting a price depending on the technical and economic conditions
- Other current contractual dispositions such as operational processes, payment schemes and management of metering can remain unchanged, unless decided by both parties.

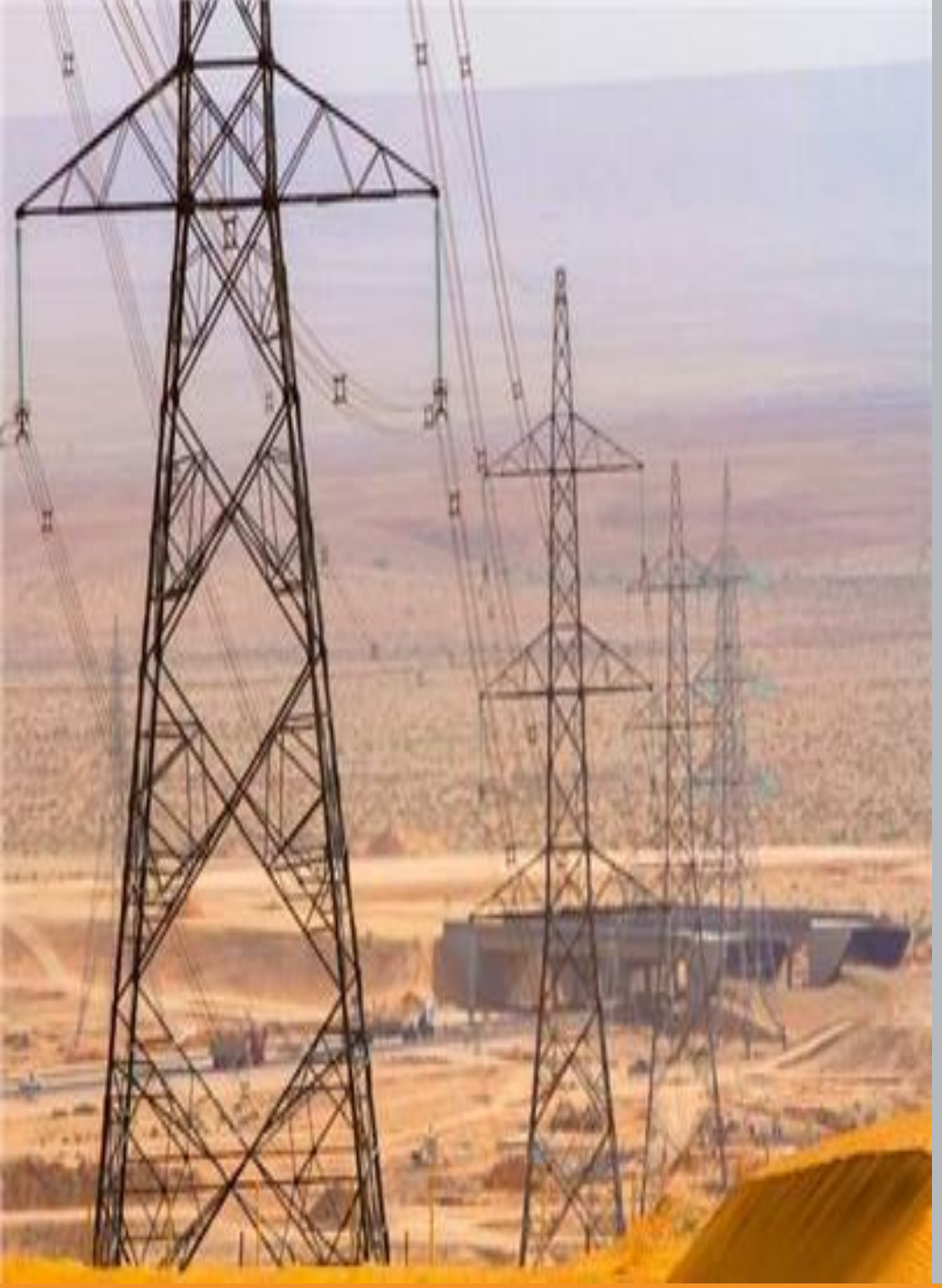


The Proposal : HOW?



Day-ahead price in Eur/MWh	Monday 09/01/2023	Tuesday 10/01/2023	Wednesday 11/01/2023	Thursday 12/01/2023	Friday 13/01/2023	Saturday 14/01/2023	Sunday 15/01/2023
Hour 1	40	40	50	50	40	40	40
Hour 2	40	40	50	50	40	40	40
Hour 3	40	40	50	50	40	40	40
Hour 4	40	40	50	50	40	40	40
Hour 5	40	40	50	50	40	40	40
Hour 6	60	60	70	70	40	40	60
Hour 7	60	60	70	70	40	40	60
Hour 8	60	60	70	70	40	40	60
Hour 9	60	60	70	70	40	40	60
Hour 10	60	60	70	70	40	40	60
Hour 11	60	60	70	70	40	40	60
Hour 12	60	60	70	70	40	40	60
Hour 13	60	60	70	70	40	40	60
Hour 14	60	60	70	70	40	40	60
Hour 15	60	60	70	70	40	40	60
Hour 16	60	60	70	70	40	40	60
Hour 17	60	60	70	70	40	40	60
Hour 18	60	60	70	70	40	40	60
Hour 19	60	60	70	60	40	40	60
Hour 20	60	60	70	60	40	40	60
Hour 21	60	60	70	60	40	40	60
Hour 22	40	40	50	40	40	40	40
Hour 23	40	40	50	40	40	40	40
Hour 24	40	40	50	40	40	40	40





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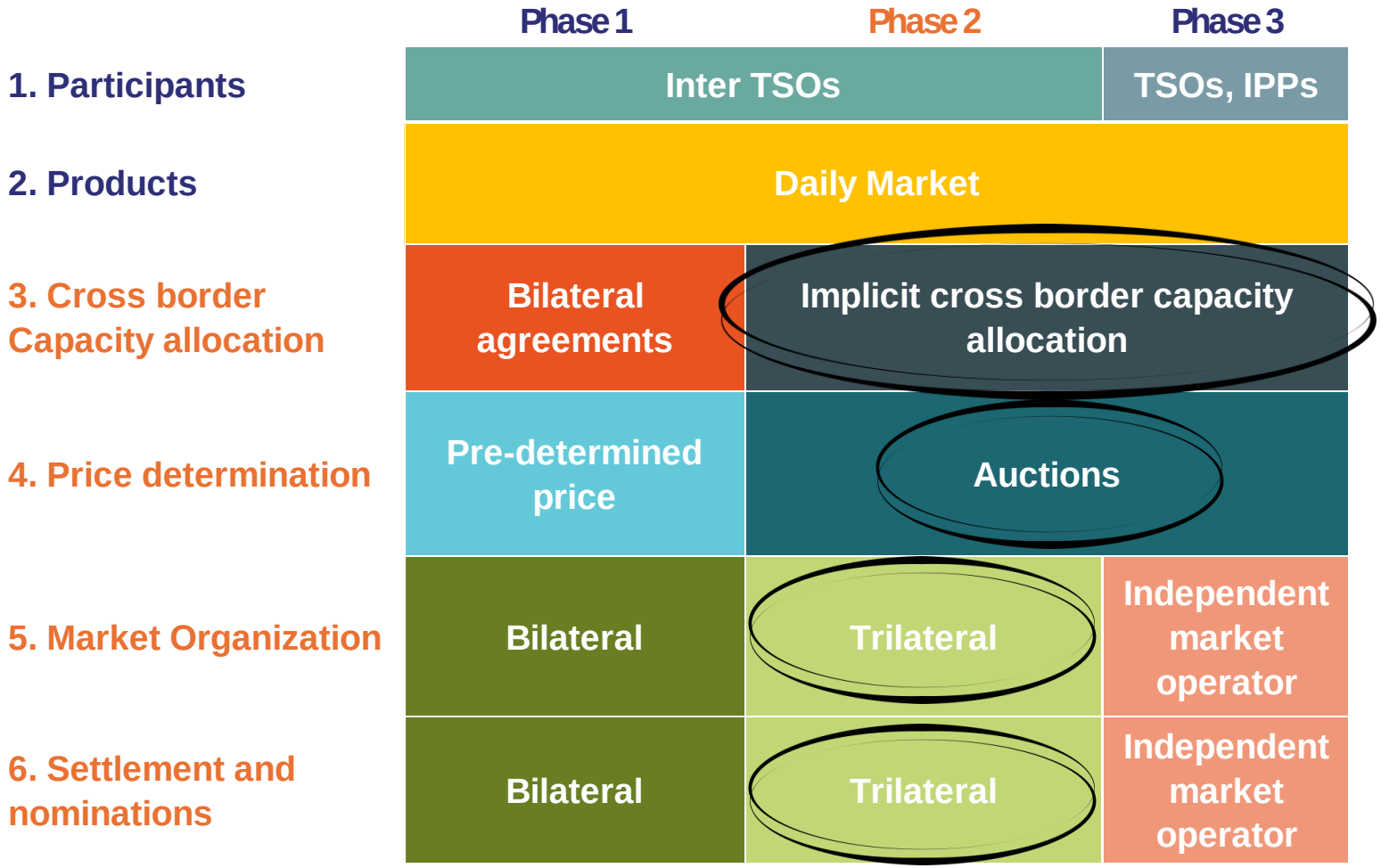
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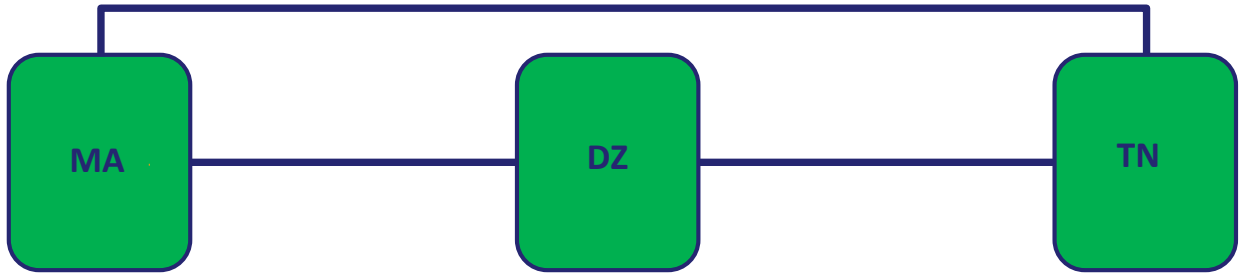
The Proposal : HOW?

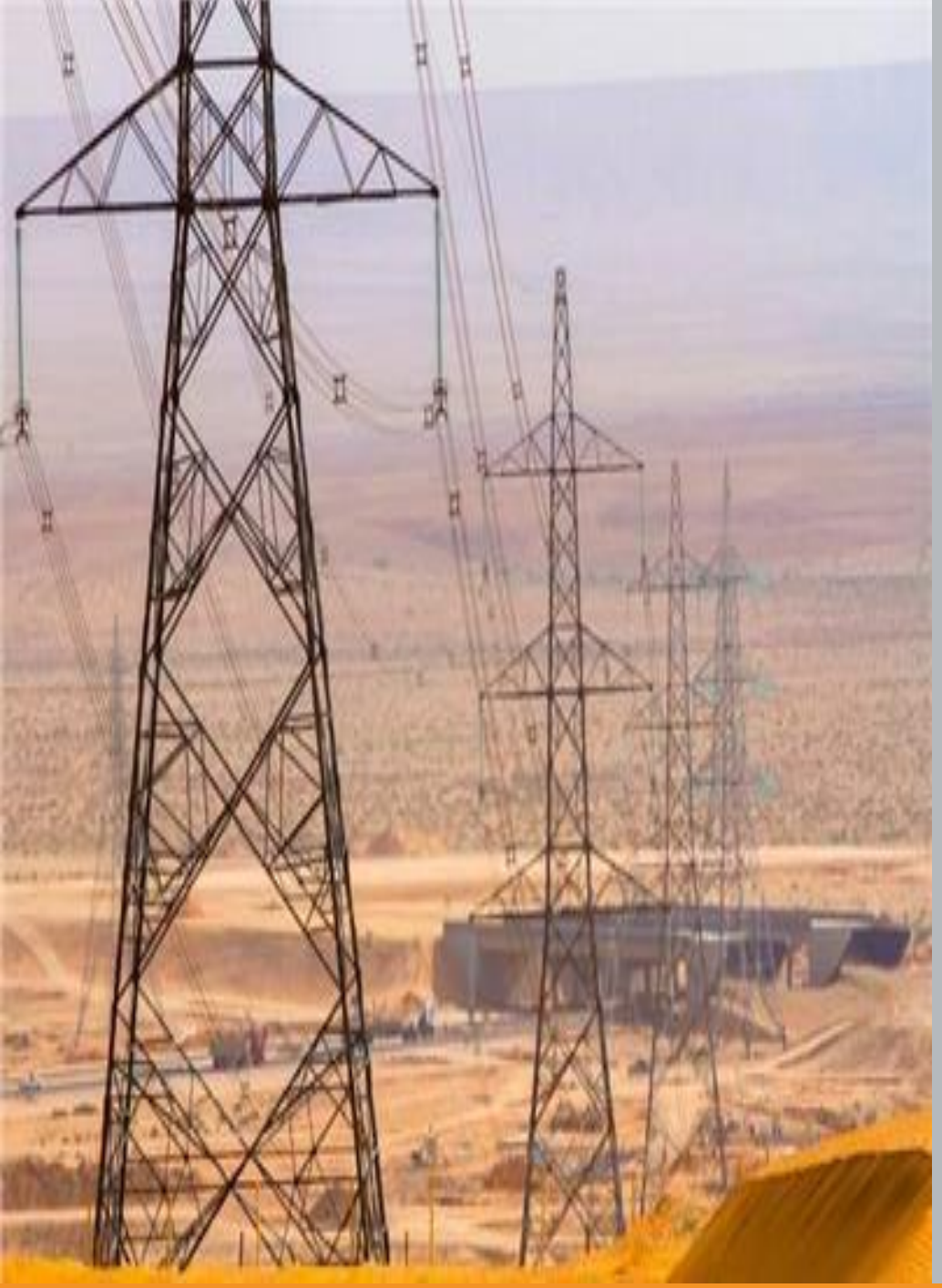
- Introduction of an auction between the three TSOs following the same rules
- the product traded is a day-ahead product for delivery the next day (or even intra-day if there is a will)
- It means that the TSOs shall elaborate bids to participate to this auction.
- The order book of each participant includes some prices and volumes which can be different for each hour.
- The organization of the auction could be performed by a **neutral counterpart**
- This new set up requires the elaboration of **wheeling agreements, market rules, new way to submit orders.**

BENEFIT COMPARED to PHASE 1:
some exchanges can take place directly between A-C, if the welfare created by those exchanges is higher than other exchanges between A-B or B-C



The Proposal : HOW?

Design Piece	recommendations
Cross Border Capacity Allocation	– Formalized Trilateral ATC calculation Process coordinated on a regional level, – Use in this stage the Postage Stamp methodology for calculating the Wheeling Charge – an agreement has to be reached on the method for the compensation of the losses (in-kind or financially) caused by the transit of additional flows as a result of commercial exchanges.
Price determination	– Enhanced integration, midway milestone, changes in the inter TSO arrangements, (depends mostly on the TSO willingness) – each participant should send the order book includes some prices and volumes which can be different for each hour
Market Organization	– **Trilateral Agreement** – It is convenient to have a **neutral third party** to organize operationally the cross-border market on a neutral and transparent way – A simplified **market platform** – Trilateral **Market Rules** (Exchange Rules, Code of Conduct, Operational rules and Definitions)
Settlement and Nomination	– Bilateral settlement – Neutral third body forward nominations to TSOs



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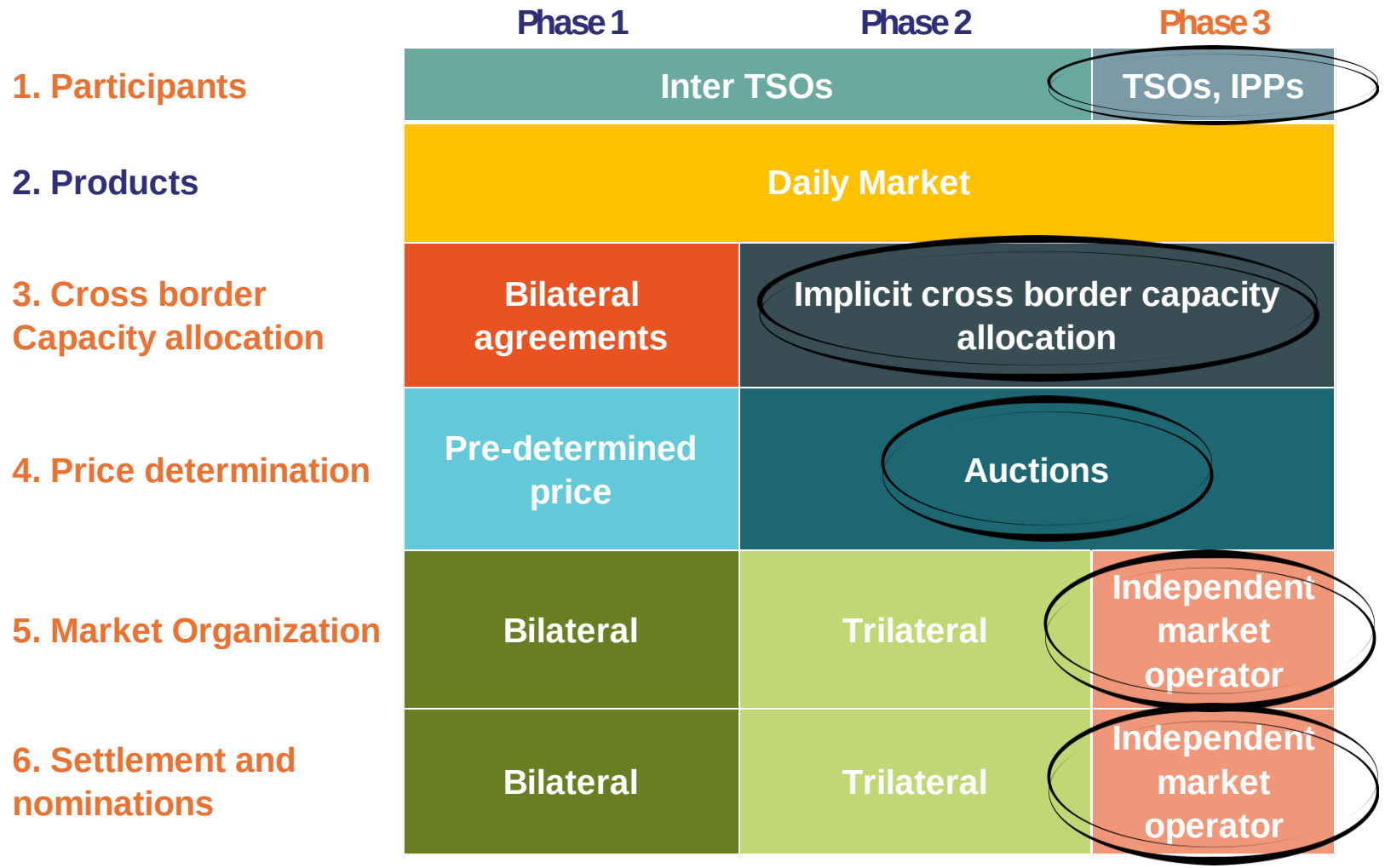
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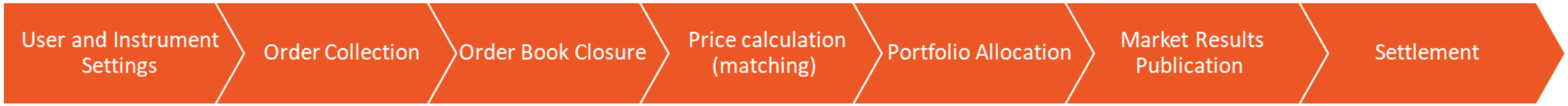
The Proposal : HOW?

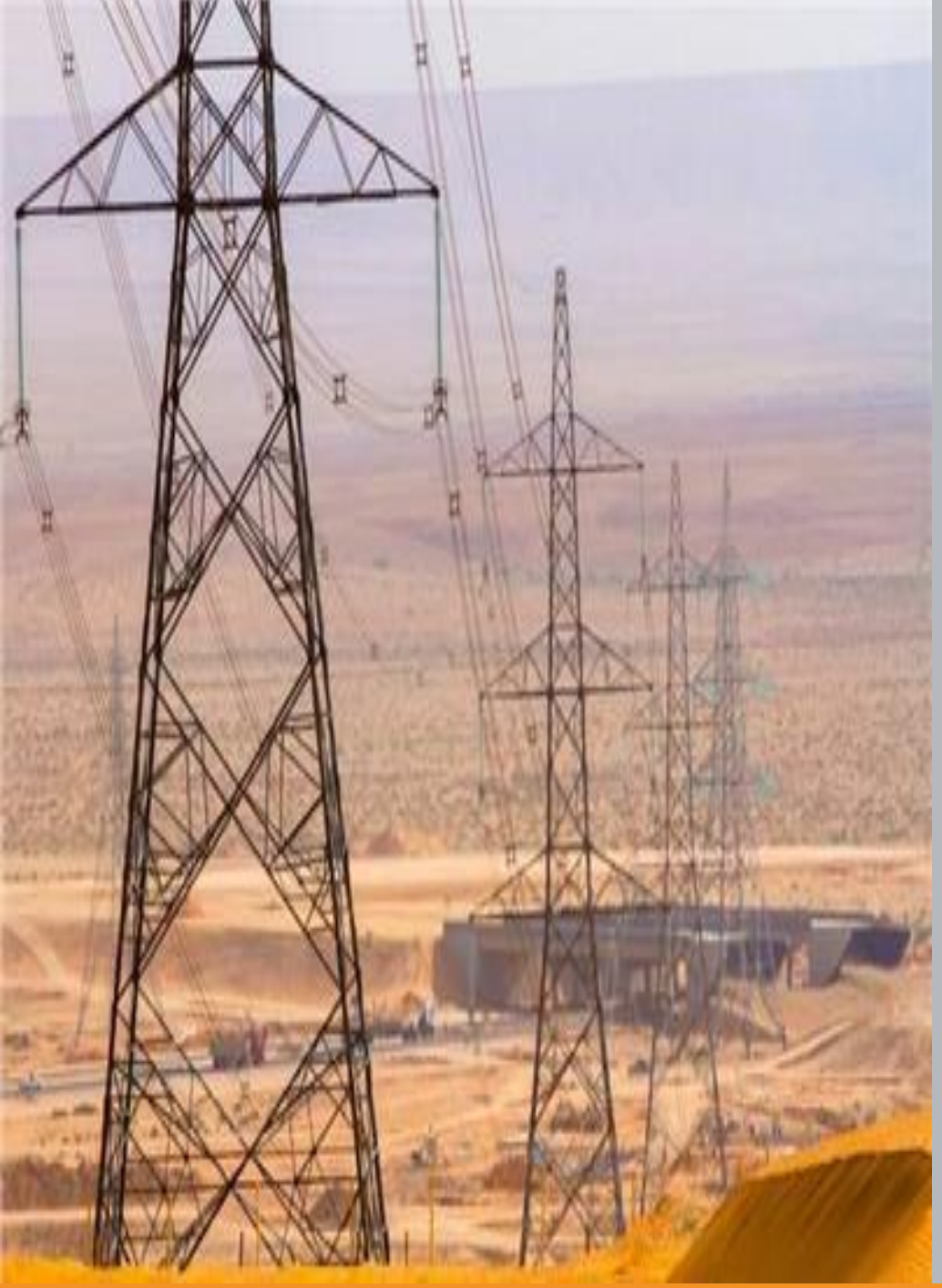
- Third party access to the market : additional participants such as IPPs, consumers, suppliers, or any other market party depending on the market opening status in each country.
- Trade information is automatically transmitted from the trading platform to the central counterpart, for settlement of the contracts.
- Nomination by the central counterpart and by the relevant Balance Responsible Parties to the TSO depending on TSOs balancing rules.
- Regular tasks performed by the Independent Market operator
- **common acceptance and approval from national Ministries/regulatory entities and/or system operators' utilities**



Recommendations for Regulatory Framework (Long Term):

The layers of the regulatory framework needed to operate the market **(long term)**

Tool	Governed by	Contents	Publication
Intergovernmental Memorandum of Understanding (IMOU)	National Governments	- principle of the market operator and areas of work	Not required to publish
Regional Operational Agreement	**TSOs**	- Ensure technical operation of the trading platform - These high-level contractual principles are further developed, and easier to amend on a regular basis - Contains pure transmission issues to be organized among the concerned TSOs, (management of available transmission capacity, methodologies to calculate the wheeling charges and grid losses,…)	recommended not to publish
Market Code	regulatory authority / Ministerial authority	- Establishment of organizational structure of the market operator and areas of work - Set-up of the market design and agreements required, detailed roles and responsibilities of all involved entities	Must be published
Market Rules	Market Operator (sometimes approved by a regulatory authority / Ministerial authority)	- Detail all rules governing market segments and products operated by the market operator - Providing the global and detailed technical frame for participation and operation of the regional trading platform	Must be published
Trading Procedures	Market Operator	- Contain the work processes and procedures to be followed on a daily basis by the market operator and the market participants (e.g. details of the settlement processes, criteria for participation, etc.) - **can be updated on a very regular basis, without approval process from the authorities**	Must be published



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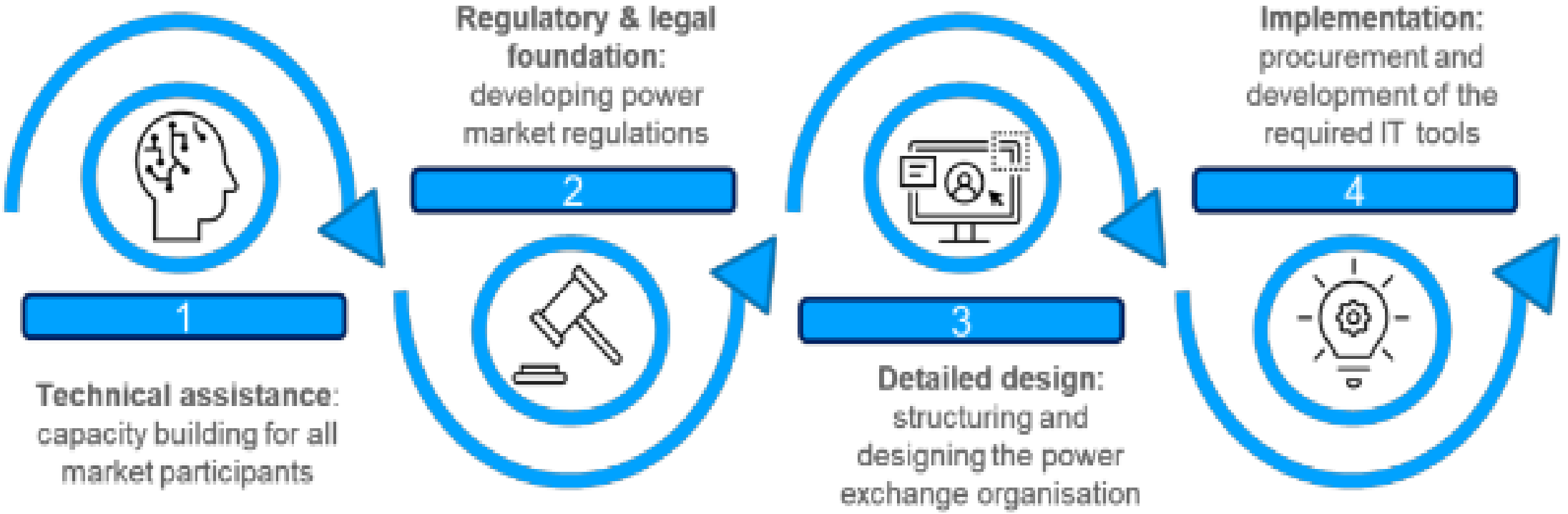
Implementation Road map:



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BACKUP

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Recommendations for Capacity calculation:

Phase 1

Fixed ATCs as agreed in the bilateral contracts (maximum values):

Current process can remain as it is

Phase 2

Phase 3

Formalized Trilateral ATC calculation Process coordinated on a regional level:

The available cross-border capacity should be coordinated centrally for the region

Recommendations for Wheeling Charges :

Phase 1

does not require any changes compared to the current situation
The is bilateral between neighbours, with electricity handed over at the borders.
No regional wheeling services offered by a third-party
No need for the implementation of regional wheeling charges.

Phase 2

Wheeling charges is a critical element of the market design,
an implicit trilateral day-ahead auction will be created
It is recommended to use in this stage the Postage Stamp methodology

Phase 3

Participation of other players in the cross-border regional market
The postage stamp methodology can still be used
The Distance Based Methodology would be recommended

In the end it is the cooperation between the three different TSOs that will determine how advanced the wheeling charge calculation methodology can be. It is always a trade-off between complexity and effort of implementation and fair compensation of the use of the grid.

Choice of a Wheeling Charge Methodology

The core principles to consider for successful wheeling charges methodology are:

- **Efficiency,**
- **Cost recovery**,
- **Simplicity of implementation**,
- **Transparency and fairness** of charges calculation,
- **Non discrimination** among all user beneficiaries of the cross-boarder trading (same wheeling charges for all)
- **Signal for investors**

Recommendations for transmission losses in cross-border transactions :

Phase 1

No need to introduce a framework for compensation of losses, as all trades are done bilaterally.
Current process can remain as it is

Phase 2

An agreement must be reached on the method for the compensation of the losses, and predefine loss factor

Phase 3

The Proposal: multi-phase approach