

ENTSOLOG and the TYNDP process

ENTSOLOG Roles and processes

ENTSOLOG System Development Area



ENTSOG role and TYNDP-related activity

1) What is ENTSOG...?



ENTSOG was created on 1 Dec 2009 and is now comprised of:

44 TSO Members and 2 Associated Partners from 26 European countries

4 Observers from EU affiliate countries:

- GA-MA AD (FYROM)
- Gassco AS (Norway)
- Swissgas AS (Switzerland)
- Ukrtransgaz (Ukraine)





1) TYNDP and Supply Outlooks are part of ENTSOG tasks

Most ENTSOG tasks are defined by the Third Energy Package

- > Development of Network Codes
- > Development of Common Network Operation Tools
- > Provision of information and data (Transparency Platform, Maps)
- > Summer and Winter **Supply Outlooks** (*WSO 2015/16 published in November 2015*)
- > **Ten-Year Network Development Plan** (*TYNDP 2015 published in April 2015*)
- > **Define a CBA Methodology** to provide common basis for the COM PCI selection procedure – (*approved by COM in February 2015*)

- > ENTSOG has voluntarily taken on -based on the request of DG ENER- the simulation of Project-specific CBAs for Project clusters, applying for PCI status



2) The ENTSOG TYNDP



The TYNDP has various objectives

- > Reg. (EU) 715: deliver a **supply adequacy outlook** and identify possible **investment gaps**
- > Reg. (EU) 347: **gather** all possible **PCI candidates**, deliver the Energy System Wide Cost Benefit Analysis (**ESW-CBA**) and be the basis for the project specific assessment of PCI candidates
- > Reg. (EU) 2015/703: basis for a long-term gas quality monitoring outlook – from TYNDP 2017

The TYNDP is developed in close cooperation with all relevant stakeholders

- > Consideration of ACER Opinion
- > Workshops and Working Sessions with stakeholders, Public Consultation of the TYNDP report
- > Cooperation with ENTSO-E

2) TYNDP: a key element of the PCI selection



TYNDP is developed under the frame of the CBA methodology

- > For TYNDP 2017: the CBA methodology approved by EC on February 2015
- > It delivers the Energy-System Wide Cost Benefit Analysis on a 20-year range
- > It is the basis for the project specific assessment (PS-CBA) of PCI candidates by promoters

TYNDP and PS-CBAs support the PCI selection by Regional Groups

- > TYNDP gathers all possible PCI candidates
- > TYNDP identifies the investment gap
- > PS-CBA, developed under the CBA methodology, ensures the assessment of all candidates on common grounds



2) TYNDP development timeline

TYNDP 2017	2015			2016												2017		
	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M
Public workshop		■					■											■
Stakeholder Joint Working Session			■	■	■	■												
Data collection							■	■										
Report edition									■	■	■	■	■	■				
Report release															■			
Public consultation																■	■	■

(Blue cells on the chart denote activity periods with green cells denoting key deliverables visible to external stakeholders.)

- > First key step: the **stakeholder engagement process**
 - 5 Stakeholder Joint Working Sessions until March 2016
 - Stakeholder contribution will be factored in final TYNDP concept (presentation in a Public Workshop in April 2016) and therefore in the TYNDP assesement
- > **Demand data collection: 21 March - 27 April**
- > **Call for projects: project submission 11 April – 8 May; cross-check 9 May - 25 May**
- > **TYNDP 2017 publication in December 2016**
 - The assessment will be final at this date, **to support the 3rd PCI selection process**
 - Following TYNDP release: public consultation and submission to ACER



TYNDP 2017 in details

1) Introduction to TYNDP 2017 presentation



The presentation is an overview, providing a high level insight into the TYNDP process

- > Detailed information can be found on ENTSOG website in
 - CBA Methodology (approved by EC in Feb 2015)
 - TYNDP2015 Methodological Chapter – Annex F
 - SJWS presentations – on all topics touched upon today there is a detailed presentation

Questions are welcome throughout the presentation



2) ENTSOG ambition for TYNDP 2017



TYNDP 2015 is the first one developed under Reg. (EU) 347

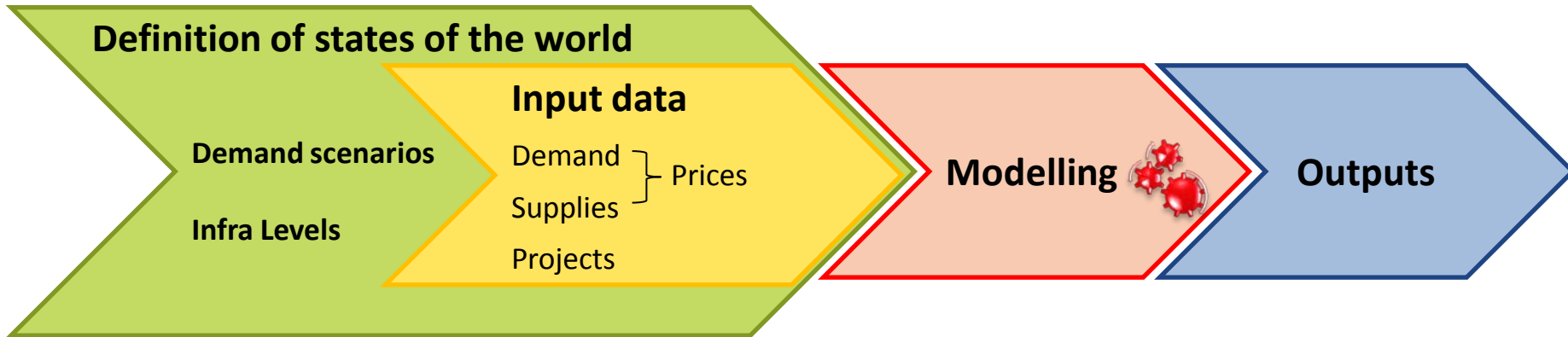
- > It has inaugurated the application of the **CBA methodology** approved by EC...
- > ... and a new role of TYNDP: being the **basis for Project-Specific CBA** of PCI candidates
- > TYNDP 2015 and the CBA methodology have allowed a **fair and valuable** assessment of PCI candidates, although perceived as **too complex**
- > Following the release of TYNDP 2015, and under the mandate of promoters, ENTSOG has handled the PS-CBA of more than 100 Groups of projects: it has allowed a **very deep and thorough testing** of the CBA methodology and TYNDP basis, and provides a **high-value feedback** that will be reflected in TYNDP 2017

Strengthened by this experience, ENTSOG has a high ambition for TYNDP 2017

- > Improve TYNDP in a **transparent** manner, making the best possible use of the approved CBA methodology
- > To deliver a **comprehensive** and yet **intelligible** TYNDP in December 2016 that will be a **reliable** basis for PCI selection

3) Introduction to TYNDP modelling

Throughout the presentation, the following steps will be discussed



TYNDP is based on a simulation tool consisting of several important blocks

- > The input data – Demand – Supply – Projects – Projects and Assumptions
- > The topology – Representation of the existing and planned infra for modelling purposes
- > The algorithm – Objective function solved by the optimization engine

What does it deliver?

- > The tool is run for different simulation cases
- > As a result it provides a number of outputs



3) Introduction to TYNDP modelling

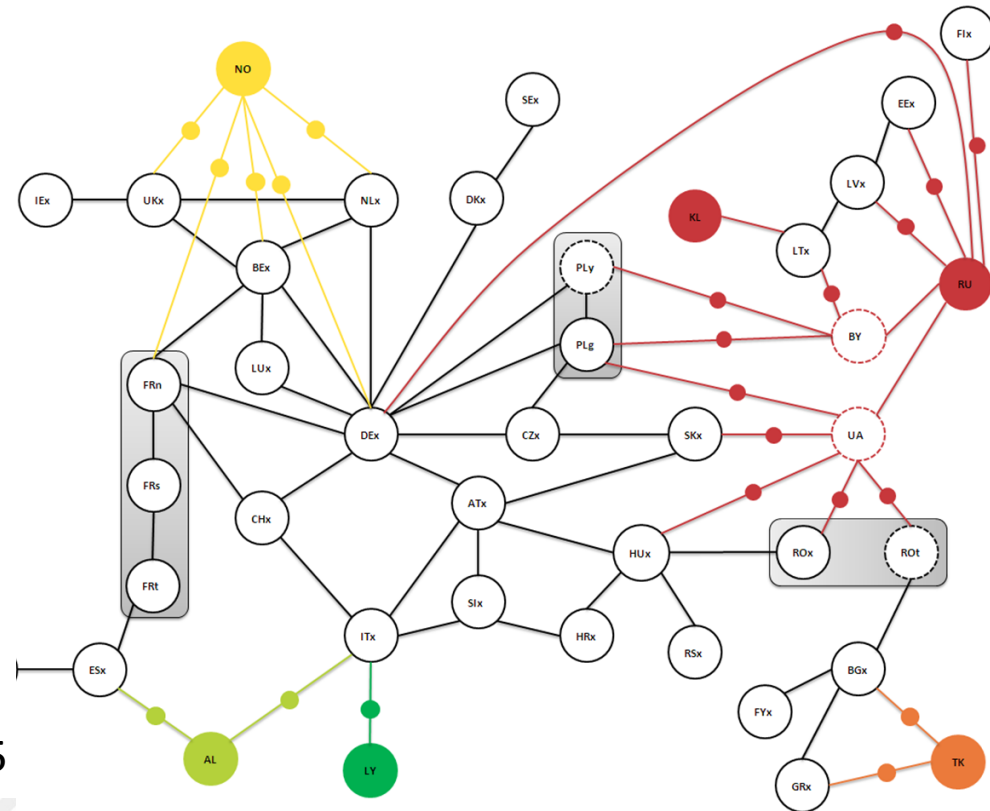


How to imagine the topology...? The shortest way problem...

> The model is at **balancing zones** level (usually **countries**) and is built of

- **Arcs** – connection between countries with capacities
- **Nodes** – demand centers representing balancing zones

- The model is a non-hydraulic, linear market model
- The objective function ensures* the EU demand/supply balance at the lowest cost
- The solution has to satisfy demand and respect arc capacities and supply limits (hard constraints)
- Details to be found in the ESW-CBA Methodology and TYNDP 2015 Annex F
- Simulation is run for 2017-2020-25-30-35



*Use of the Jensen solver as developed by Paul Jensen for the Texas University in Austin (<https://www.me.utexas.edu/~jensen/ORMM/index.html>)



3) TYNDP modelling process overview

Input data set

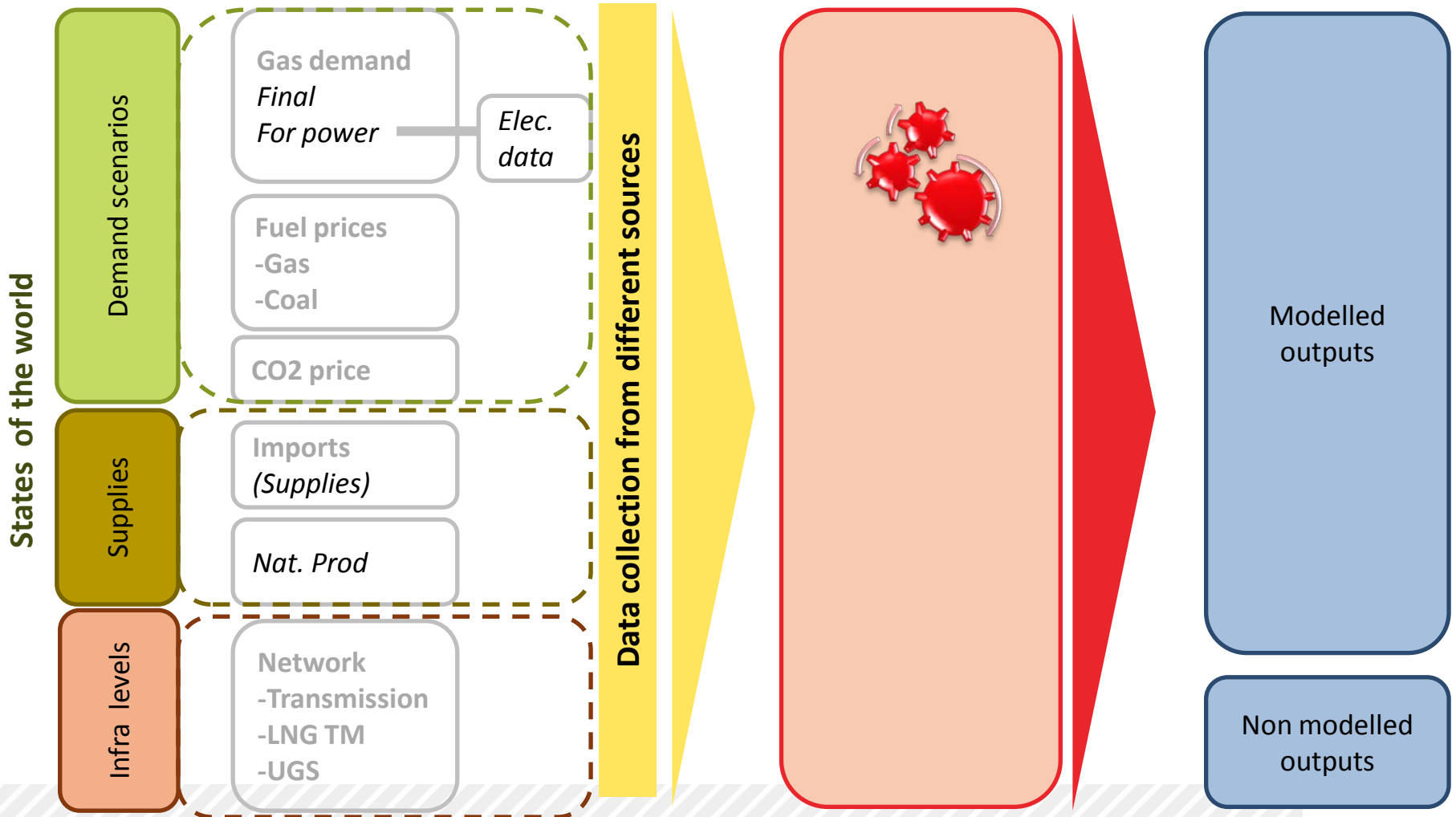
Data categories defined by Reg. 347

Modelling tool

described in CBA meth.

Outputs

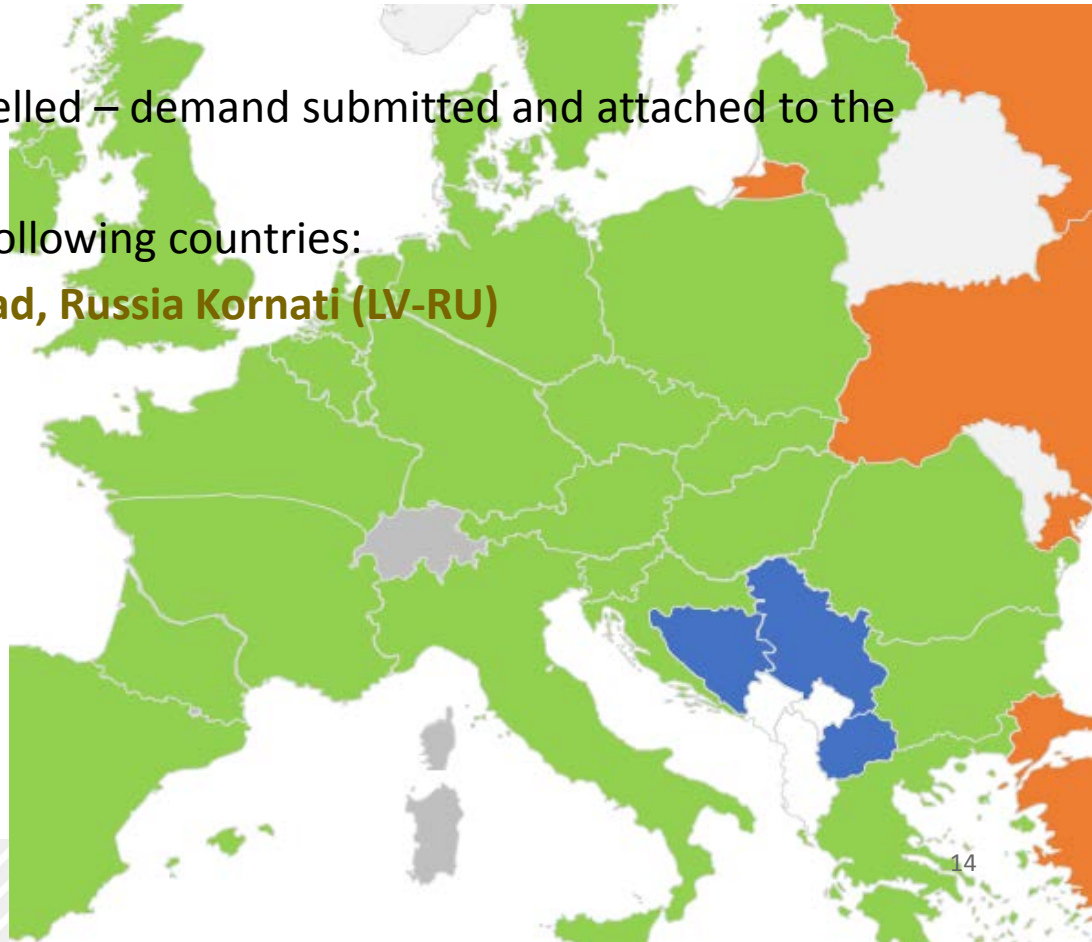
defined by CBA meth.



3) Geographical Scope of the TYNDP modelling

The following countries are included historically in TYNDP modelling

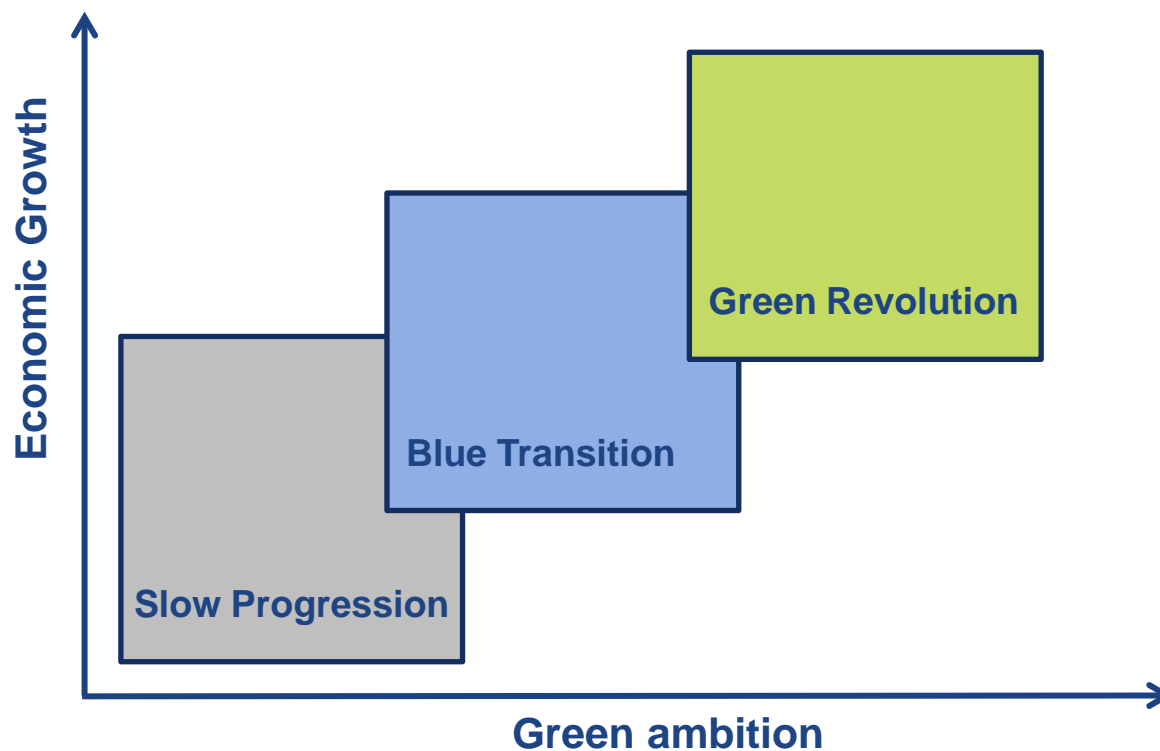
- > Modelling is done for EU28+
- > From contracting parties:
 - **Serbia, BiH** and **FYROM** are modelled – demand submitted and attached to the Balancing Zone
- > Exports have been assumed to the following countries:
 - **Turkey, Ukraine, Russia Kaliningrad, Russia Kornati (LV-RU)**



4) Demand in the TYNDP - scenarios

Scenarios are possible story lines for the EU energy sector in the future

- > ENTSOG sees **3 scenarios**
- > Aim is to develop plausible story lines for a range of demand.
- > ENTSOG is not assigning weight (chance of occurrence) to any of them.

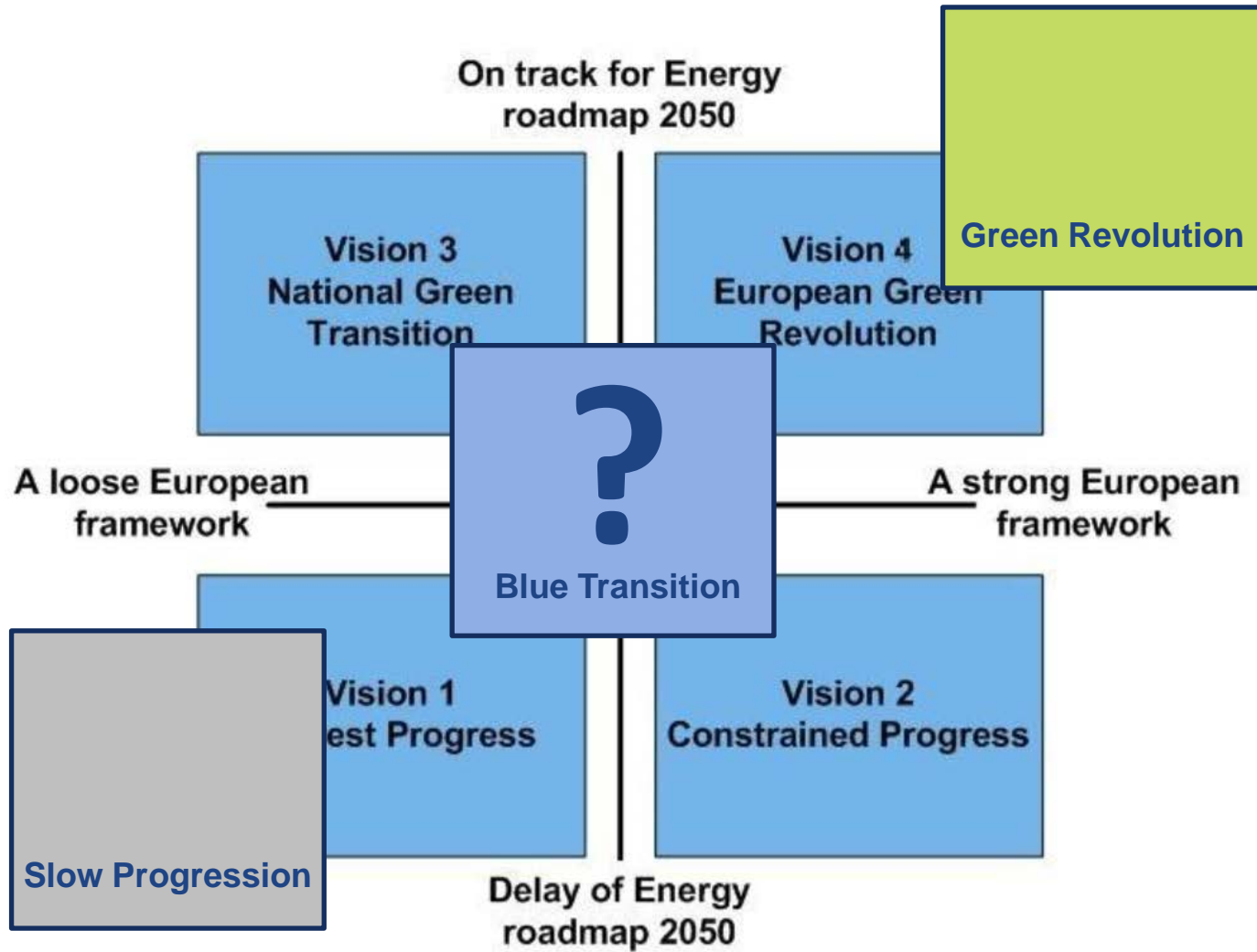


*Scenario descriptions are developed as guidance for TSOs to submit bottom-up demand data.
ENTSOG does not calculate demand based on the scenarios.*

4) Demand Scenarios: the story lines

TYNDP 2017 Scenarios	Slow Progression	Blue Transition	Green Revolution
Energy Policies/ Regulation	2050 targets not realistically reachable	Mainly on track with 2050 targets [closure of coal-fired power plants (regulation)]	On track with 2050 targets
Economic conditions	Limited growth	Moderate growth	Strong growth
Green ambitions	Lowest	Moderate	Highest
CO2 price	Lowest CO2 price (limited spread of carbon taxes)	Moderate CO2 price (carbon taxes mainly spread)	Highest CO2 price (carbon taxes well spread)
Fuel prices	Highest fuel prices [expected gas price > coal price]	Moderate fuel prices [expected gas price > coal price]	Lowest fuel prices [expected gas price > coal price]
Internal energy market	Well functioning, low MS cooperation	Well functioning, moderate MS cooperation	Well functioning, strong MS cooperation
Renewables develop.	Lowest	Moderate	Highest
Gas in heating sector			
Energy Efficiency	Slowest improvement	Moderate improvement	Fastest improvement
Competition with electricity	Limited gas displacement by elec. (new buildings)	Limited gas displacement by elec. (new buildings)	Gas displaced by electricity (district heating, heat pumps)
Electrific. of heating	Lowest	Moderate	Highest
Gas in power sector			
Gas vs Coal	Coal before Gas	Gas before Coal (on regulatory basis)	Gas before Coal (on regulatory basis)
Gas in transport			
Gas in transport	Lowest penetration	Highest penetration	Moderate penetration
Electricity in transport	Lowest penetration	Moderate penetration	Highest penetration
Expectations regarding EU overall gas demand	Expected to remain stable	Expected to increase	Expected to decrease

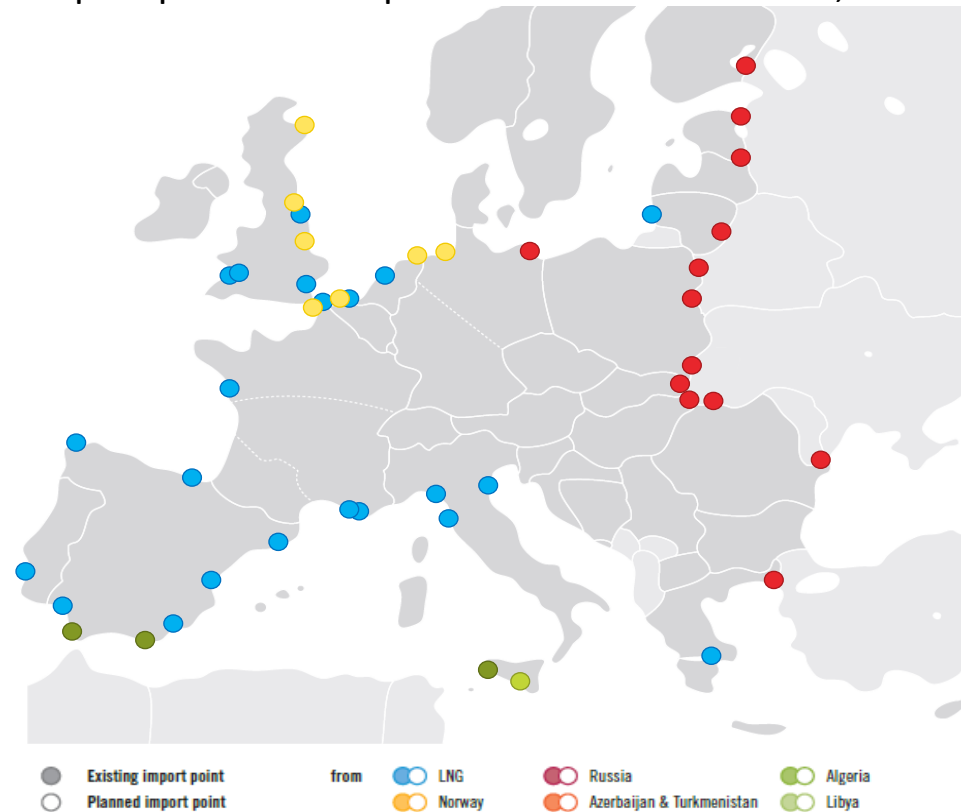
4) How do ENTSO-E scenarios align with ours



5) Introduction to Supplies in the assessment

Supplies potentials are defined for each source

> Supply arrives to EU import points – except for National Production, which is always used first



> Reference price is anchored to reknowned source – IEA WEO2015 scenarios

> Price configurations are developed to check the effect of sources beeing cheap or expensive

- LNG cheap – expensive; Russian cheap – expensive; Azeri cheap; Neutral

6) TYNDP Outputs

What kind of assessment results does the TYNDP assessment generate?

- > TYNDP assessment frame is defined by the CBA methodology
- > There are 3 types of information that can be extracted from the model results.

Indicators

SOS Indicators

- Remaining Flexibility
- USSD/CSSD

Strongly model dependent indicators

- SSPDe
- SSPDi

Non-modelled indicators

- IRD
- Bi-Directional
- N-1

Indicators with possible Monetization

Disrupted Demand (DDD)

- Disruption resulting from a demand effect (2W/DC)
- Disruption resulting from a supply effect (route disruption)

Standardized Monetization

Integrated Market config

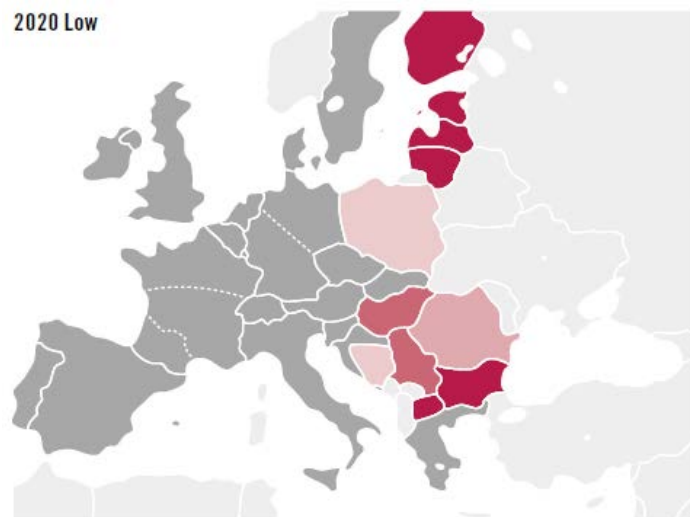
- EU supply bill AS/AW
- Marginal Prices



Learnings from TYNDP 2015

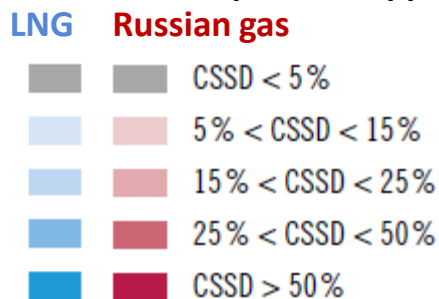
Learnings from TYNDP 2015

Investment gap: situation for 2020, based only on FID projects



Regions lacking of integration still strongly rely on specific supply sources

Minimum share of **Russian gas** / **LNG** in countries' yearly supply mix under a cooperative approach



- > Results are shown under a cooperative approach between Member States
- > Under an uncooperative approach, situation in some Member States would be exacerbated

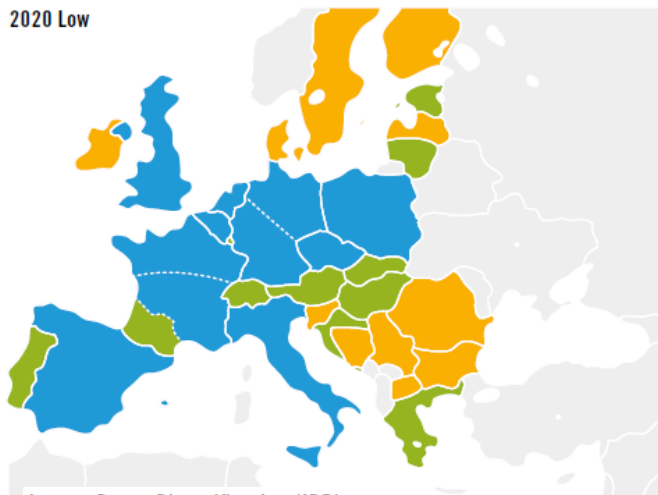
Learnings from TYNDP 2015

Investment gap: situation for 2020, based only on FID projects

Regions lacking of integration face lower diversification and competition

Level of import route diversification (IRD)

2020 Low



Import Route Diversification (IRD)

Low route diversification: > 6150

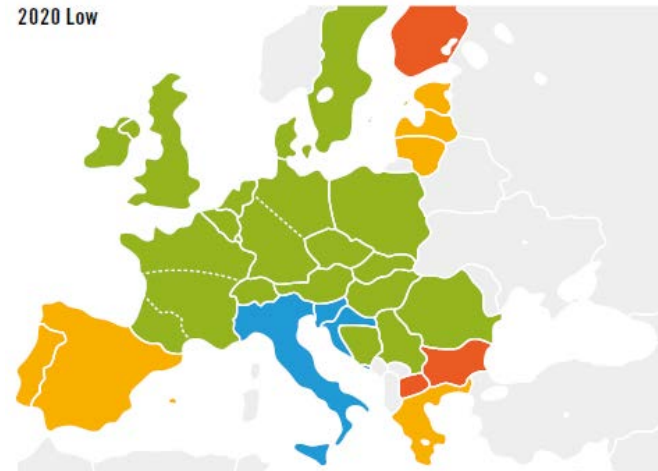


High route diversification: < 3580

The IRD is an HHI-type indicator measuring the diversification of paths that gas can flow through to reach a zone, based on the entry capacity split between entry points. The lower the value, the better the diversification is.

Level of supply source price diversification (SSPDi)

2020 Low



Number of import sources including at least 20% SSPDi reaction

1

2

3

4

This assessment focuses on import sources (LNG, Russian, Norwegian, Algerian, Lybian and Azeri gas) and is not considering European production. The assumption of well-functioning markets across Europe may give a picture more positive than currently perceived.

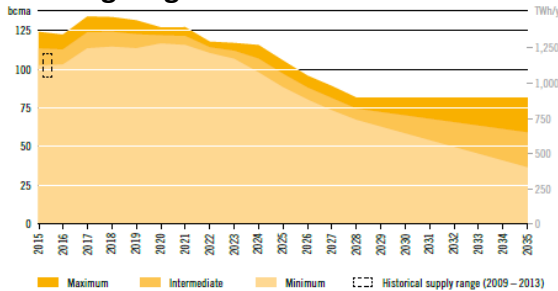
Low = Low Infrastructure level: only existing infrastructures and FID projects considered in the assessment

Learnings from TYNDP 2015

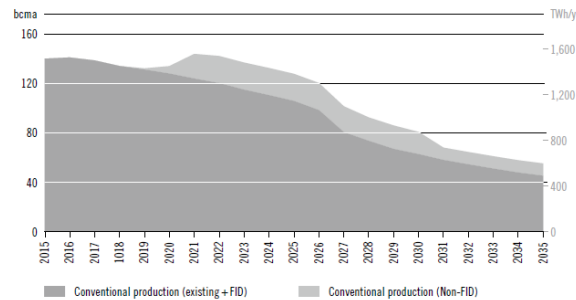
Investment gap on the longer term

Europe faces Norway and indigenous production decline...

Norwegian gas

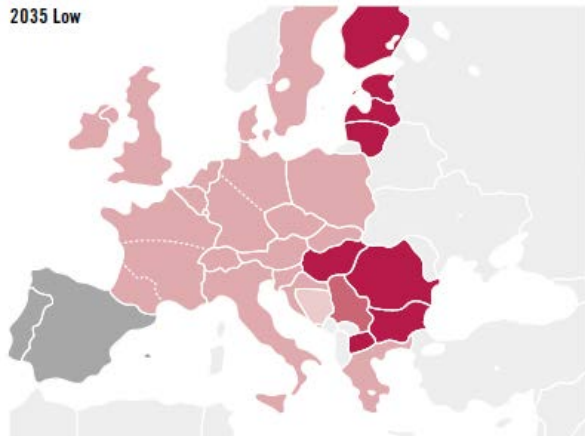


Indigenous production

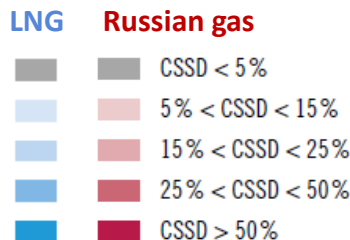


By 2035, without new supplies and related infrastructure projects, Europe supply diversification would be at risk

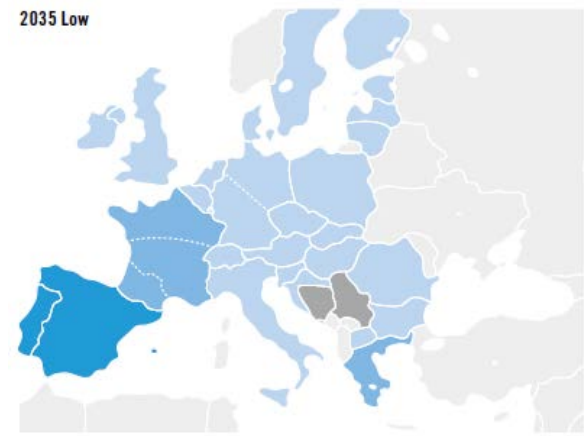
2035 Low



Minimum share of **Russian gas** / **LNG** in countries' yearly supply mix under a cooperative approach



2035 Low



Low = Low Infrastructure level: only existing infrastructures and FID projects considered in the assessment
 CSSD = Cooperative Supply Source Dependence



Including a country in TYNDP



Including a country in TYNDP



There are 2 ways of being included in TYNDP

- > Full inclusion
- > Inclusion as importing country

Current legal basis for TYNDP is community-wide analysis

Including a country in TYNDP

Full inclusion

> Following data are needed

- Demand data
 - Infrastructure data: data on existing infrastructure:
 - Interconnection points: capacities
 - Underground storages: working gas volume, injection and withdrawal capacities, deliverability curves
 - LNG terminals: send-out capacities and stocks in tanks
 - Infrastructure data: data on planned infrastructure => using ENTSOG Project Portal
- > In TYNDP 2015: Serbia, Bosnia-Herzegovina, FYROM

Full inclusion is demanding in terms of data submission

Demand Data for full inclusion in the modelling

To fully consider a balancing zone, the following data should be available throughout the time horizon with good reliability:

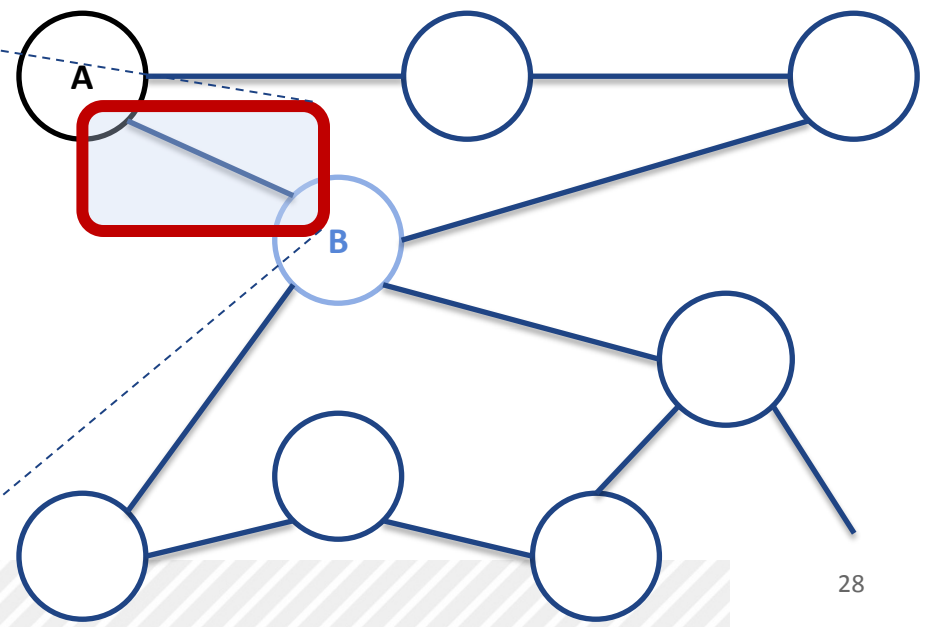
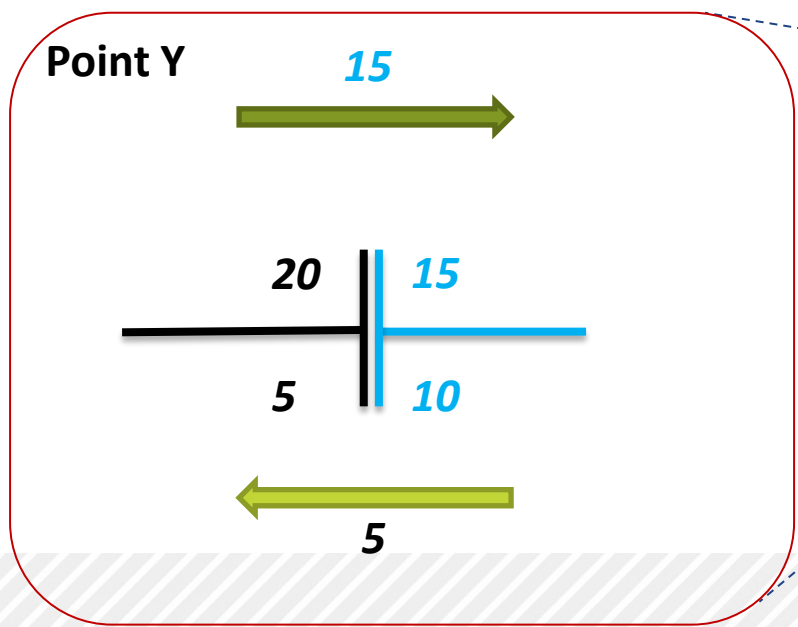
- > Demand – as Historical Data from 2010 and Forecast for TYNDP time horizon for the 3 scenarios
 - **1-in-2 yearly average** (GWh/d)
 - **2-Week peak average** (GWh/d)
 - **Daily peak** (GWh/d)
 - **Seasonal Demand Factor** – ratio btw. summer and winter daily average consumption
- > Demand data used for consistency check:
 - Final Demand (Residential & Commercial, Industrial and Transport) (GWh/d)
 - Demand Power Generation
 - Residential and Commercial
 - Industrial and Transport
 - Non-Network
- > We are considering to split demand data into existing demand and gasification (new demand generated by new import capacity) to avoid disruptions due to unrealistically high demand input

Demand should not exceed the capacity of importing infrastructure

Project Submission into the TYNDP2017 What is a Project...?

There is an already existing network topology – e.g. Low Infra Scenario – 2025

- > Available information:
 - Which Point
 - What capacities
 - Which operators

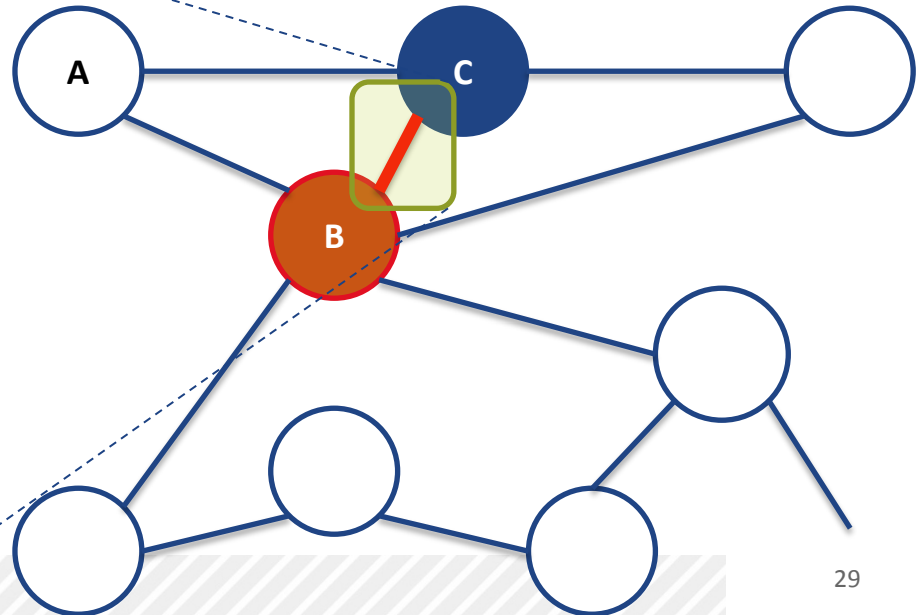
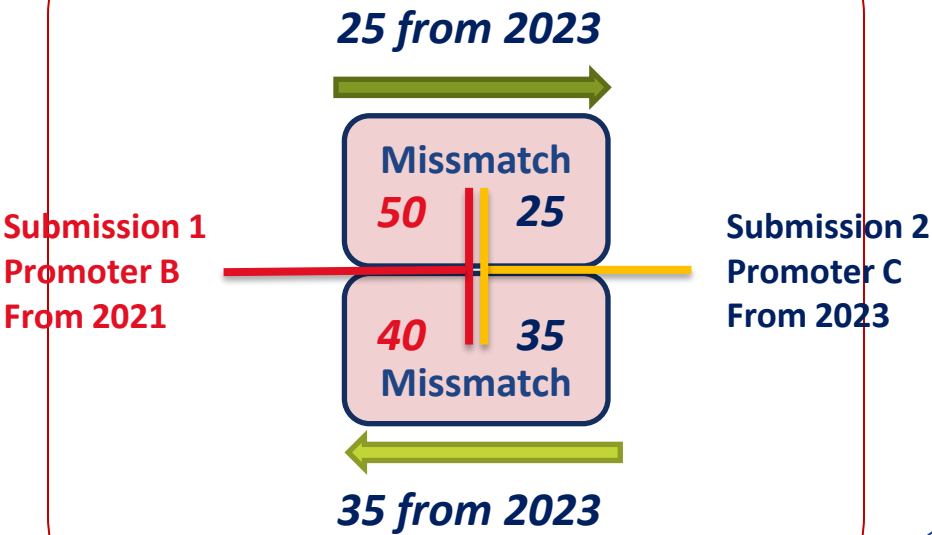


Project Submission into the TYNDP2017 What is a Project...?

And a Project is submitted between countries B and C...

- > The minimum information to enable the assessment of the Project are seen below:
 - Point Name (if necessary create new point); Capacities; Commissioning Date; FID Status; Maturity

Point X between country B and C





Project Submission: Minimum set of data

The following information is the minimum set of data which is necessary to enable ENTSOG to simulate a project

Transmission Projects	LNG Project	UGS Project
Project Name		
Project Promoter Name		
Capacity Modification or actual Investment Project		
FID Status		
PCI Status		
Commissioning Year		
Incremental Capacity on the given IP	LNG Send out capacity = Incremental Capacity on the given IP	Injection and Withdrawal capacities = Incremental Capacity on the given IP
	Incremental LNG Tank volume	Incremental working volume
The given IP		
Flow Direction		
Modelled Project Variant Selected if several variants are submitted		
Elements within Project Schedule and inclusion in National Development Plan to be retained for the definition of project maturity		
Confirmation of the Disclaimer		



Project Submission process: What's new

- > Updated ENTSOG Data Portal
- > Updated Documentation on Data Submission and Data Portal functionality
- > Collection of Project Costs to enable the monetization of Infrastructure levels in the TYNDP
- > Enhanced collection of Project schedules for newly introduced Maturity Criteria



The Project Submission process

The submission of Up-to-Date, Timely and Correct Project information is a prerequisite for the assessment

		14 - March	Ma - Ma - Ap	11 - April	18 - April	25 - April	02 - May	09 - May	16 - May	23 - May	30 - May
Publication of ENTSOG Documentation Kit											
Information email and Press Release about ENTSOG Data Collection Procedure	15/03/2016										
Account Validation and Creation Starts											
Data Collection - Project Submission	11/04/2016 - 08/05/2016										
Data Consistency Check	09/05/2016- 25/05/2016										

Project Submissions are accepted during this time only - full submissions by 08/05

Non-matching capacities can be modified or Projects can be deleted

Coordination of Promoters shall start well before the Data Collection. Fully non-coordinated Projects will not be modelled – Lesser of Rule



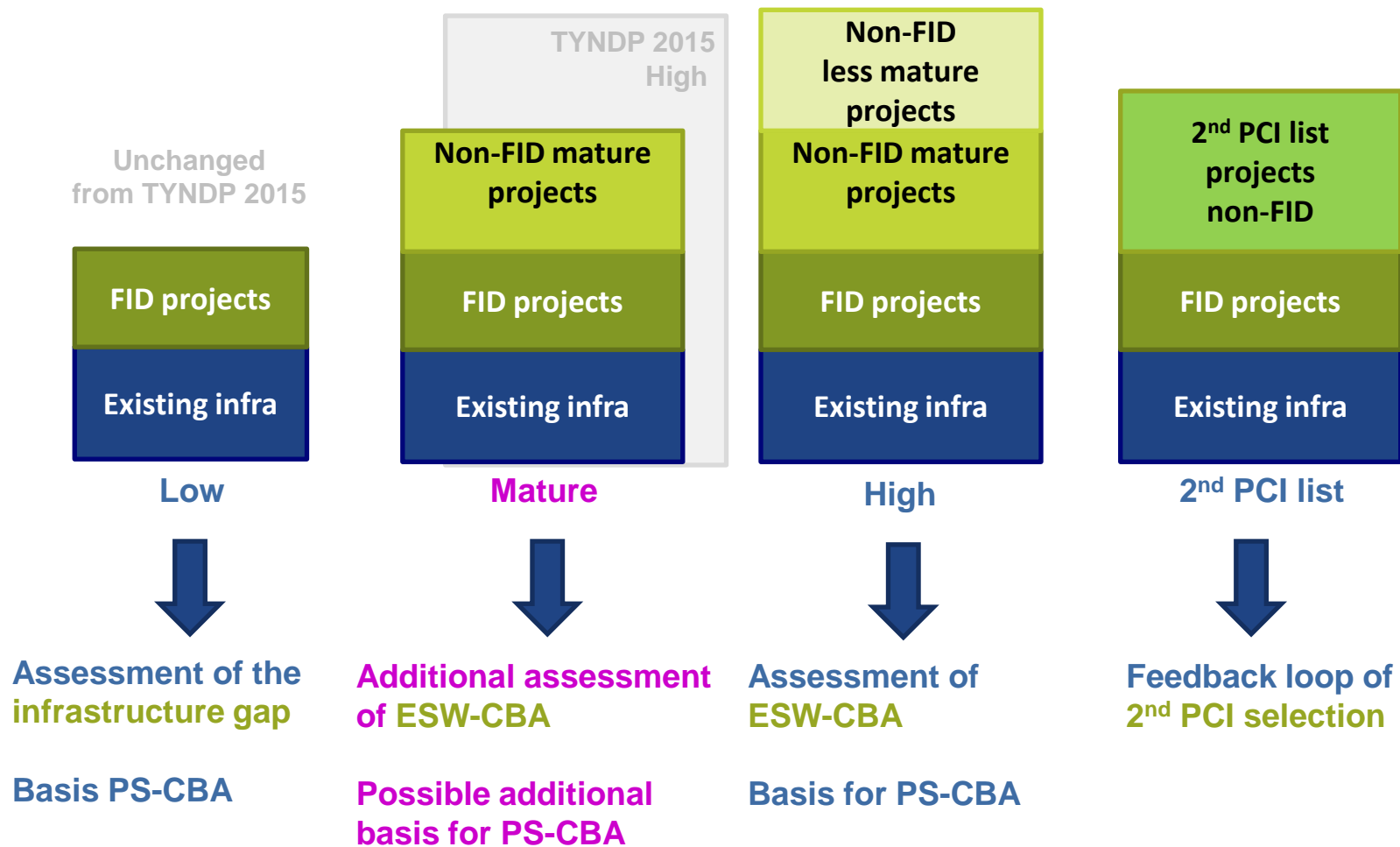
The Project Submission process

Where to submit Projects – within the geographical scope of TYNDP

- > <https://data.entsog.eu/> - ENTSOG Data Portal
- > Documentation to become available on 15 March
- > Check/ ask for credentials
- > Contact ENTSOG for Project topology

- > Functionality of the Data Portal
 - Submit/ delete/ modify Projects and their increments
 - Check Project representation in ENTSOG topology
 - Check submitted capacities and their matching on interconnection Points

Modelled Infrastructure Levels in TYNDP 2017



For TYNDP 2017, ENTSOG proposes to introduce an additional **Mature Infrastructure Level** based on a maturity criterion for non-FID projects

Including a country in TYNDP

Conclusions on full inclusion

- > Full inclusion is demanding in terms of data

- > Gas system is optimised at the level of EU + included countries => goes beyond Reg 347 requirements

- > Included countries are fully assessed along all TYNDP indicators
- > Countries already in TYNDP 2015 will stay in TYNDP 2017
- > Full inclusion of additional countries
 - Could be usefully tested as part of other ENTSOG deliverables (such as Winter Outlook)
 - Would need to be carefully considered for TYNDP 2017

- > Another solution may be considered: inclusion as importing country

Including a country in TYNDP

Inclusion as importing country

- > Necessary data:
 - expected import flows from the EU over the next 20 years
 - Capacities of cross-border infrastructure

- > ENTSOG is investigating using projected country data (demand projections, ...) to derive import flows

- > This could allow to consider projects allowing for country's gaseification
 - In Low Infra Level: imports based on gas demand as allowed by existing infrastructure
 - In Mature / High Infra Level: imports based on gas demand as allowed by planned infrastructure

- > Additional import flows linked to gaseification would be part of TYNDP. But it will come with costs (supply costs).

- > Benefits of gaseification are up-to-now not handled in the TYNDP modelling => handling aside the modelling is under consideration



Thank You for Your Attention

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