Network Code Interoperability and Data Exchange Rules

1st Stakeholder Joint Working Session

Brussels – 14 Nov 2012

entsog
european network
of transmission system operators
for gas

Welcome

Network Code Interoperability and Data Exchange Rules

1st Stakeholder Joint Working Session

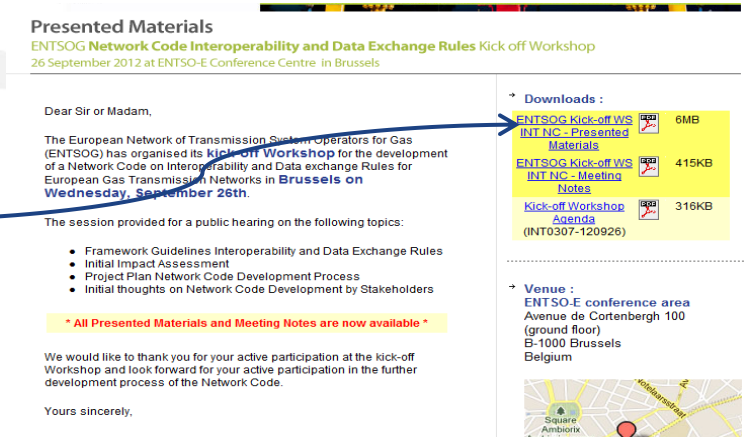
Panagiotis Panousos

Business Area Manager, System Operation

Brussels – 14 Nov 2012

Introduction to 1st SJWS

- Kick-off workshop 26th Sep:
  - ≈80 participants
  - Presented material and notes published



Presented Materials

ENTSOG **Network Code Interoperability and Data Exchange Rules** Kick off Workshop
26 September 2012 at ENTSO-E Conference Centre in Brussels

Dear Sir or Madam,

The European Network of Transmission System Operators for Gas (ENTSOG) has organised its **kick-off Workshop** for the development of a Network Code on Interoperability and Data exchange Rules for European Gas Transmission Networks in **Brussels on Wednesday, September 26th**.

The session provided for a public hearing on the following topics:

- Framework Guidelines Interoperability and Data Exchange Rules
- Initial Impact Assessment
- Project Plan Network Code Development Process
- Initial thoughts on Network Code Development by Stakeholders

* All Presented Materials and Meeting Notes are now available *

We would like to thank you for your active participation at the kick-off Workshop and look forward for your active participation in the further development process of the Network Code.

Yours sincerely,

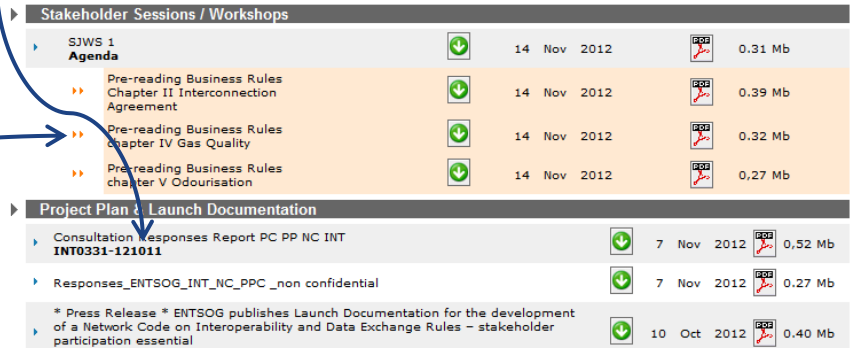
Downloads :

ENTSOG Kick-off WS INT NC - Presented Materials 6MB
ENTSOG Kick-off WS INT NC - Meeting Notes 415KB
Kick-off Workshop Agenda (INT0307-120926) 316KB

Venue :
ENTSO-E conference area
Avenue de Cortenbergh 100
(ground floor)
B-1000 Brussels
Belgium

- Draft Project Plan consultation:
  - 37 responses received
  - Non-confidential responses&report published

- 1st SJWS
  - Agenda & material published



Stakeholder Sessions / Workshops

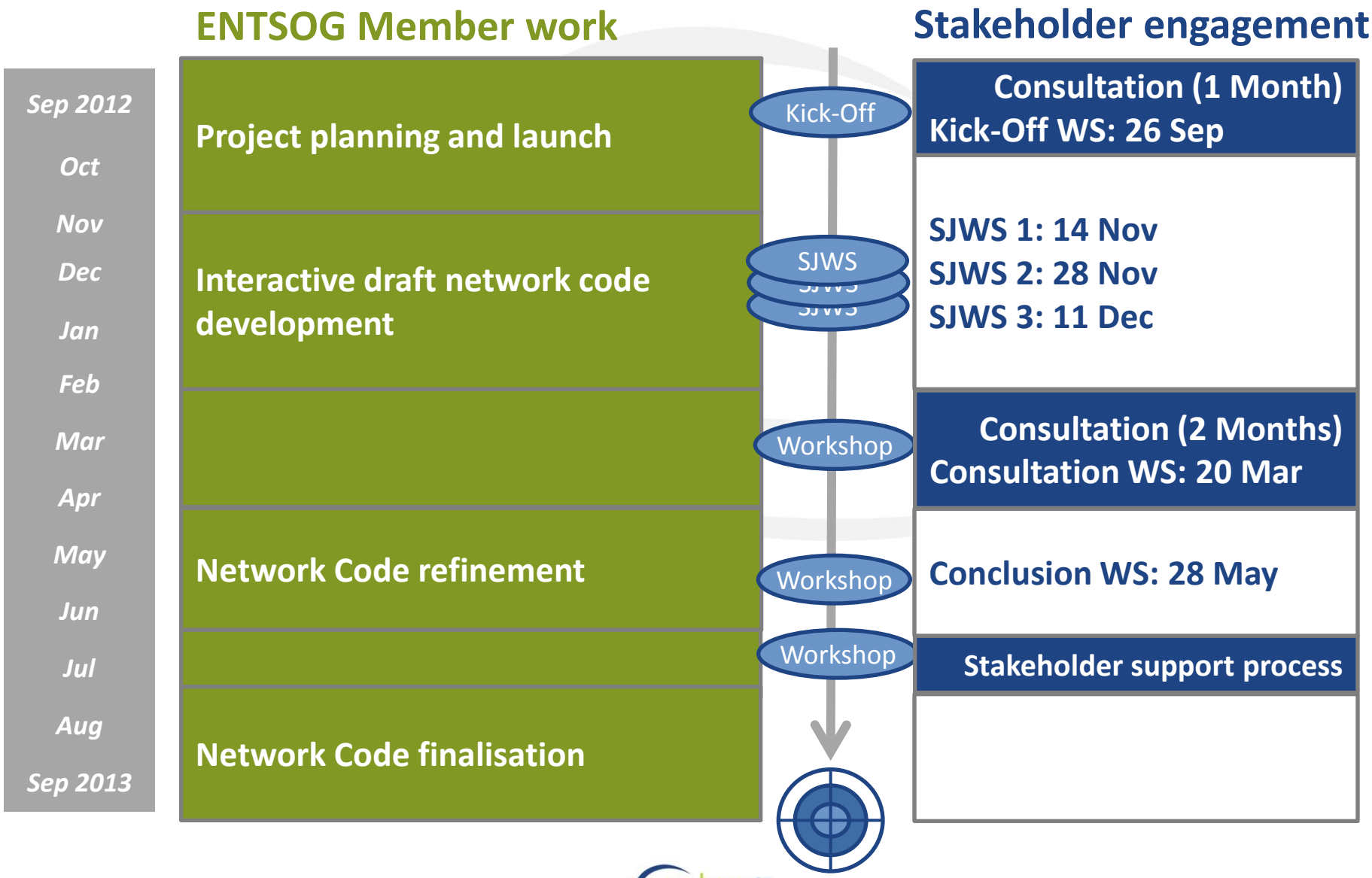
SJWS 1 **Agenda**	14 Nov 2012		0.31 Mb
Pre-reading Business Rules Chapter II Interconnection Agreement	14 Nov 2012		0.39 Mb
Pre-reading Business Rules chapter IV Gas Quality	14 Nov 2012		0.32 Mb
Pre-reading Business Rules chapter V Odourisation	14 Nov 2012		0,27 Mb

Project Plan & Launch Documentation

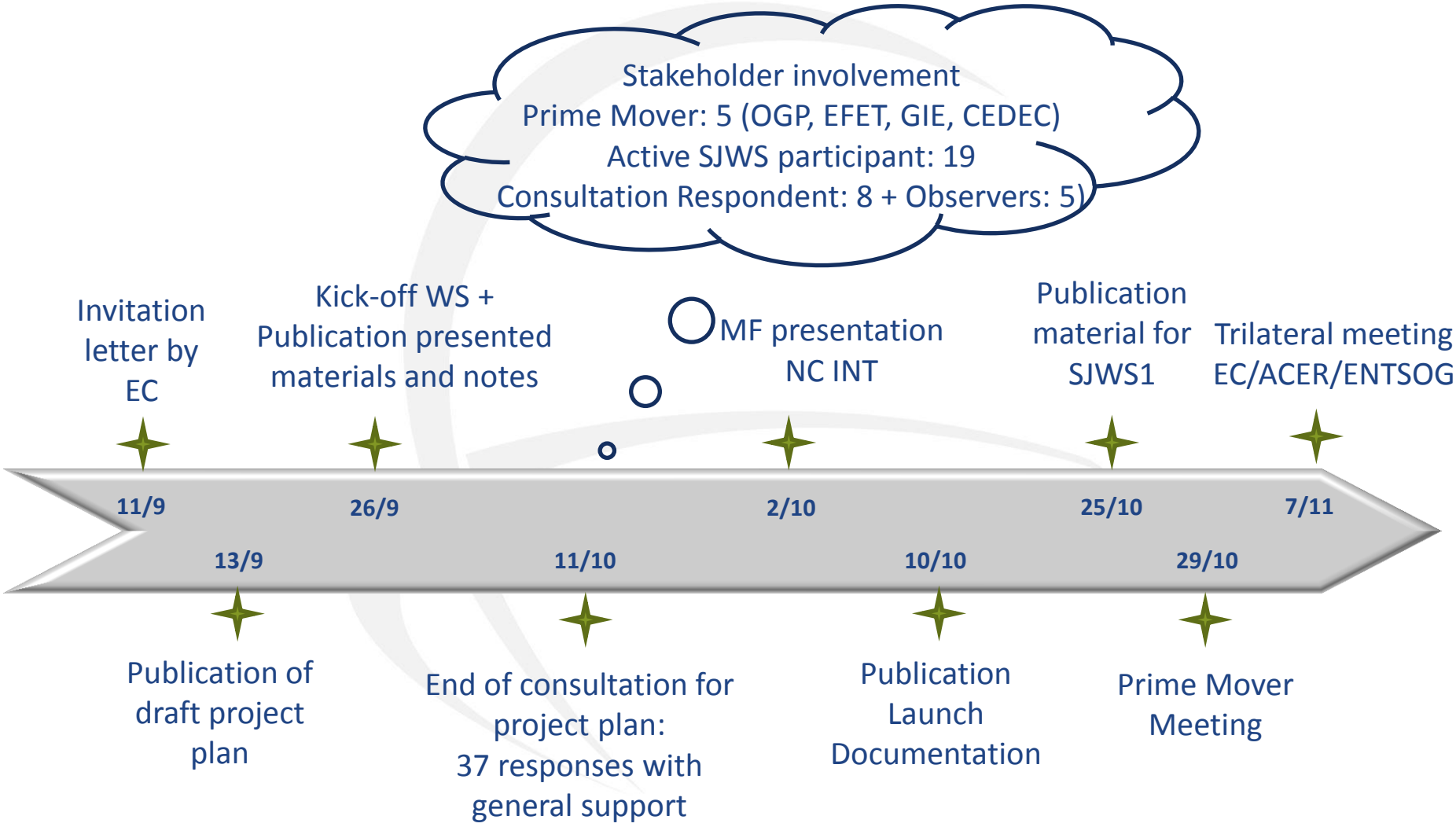
Consultation Responses Report PC PP NC INT **INT0331-121011**	7 Nov 2012		0,52 Mb
Responses_ENTSOG_INT_NC_PPC _non confidential	7 Nov 2012		0.27 Mb
* Press Release * ENTSOG publishes Launch Documentation for the development of a Network Code on Interoperability and Data Exchange Rules – stakeholder participation essential	10 Oct 2012		0.40 Mb

- 2nd SJWS
  - Registration is open (till 22nd Nov)

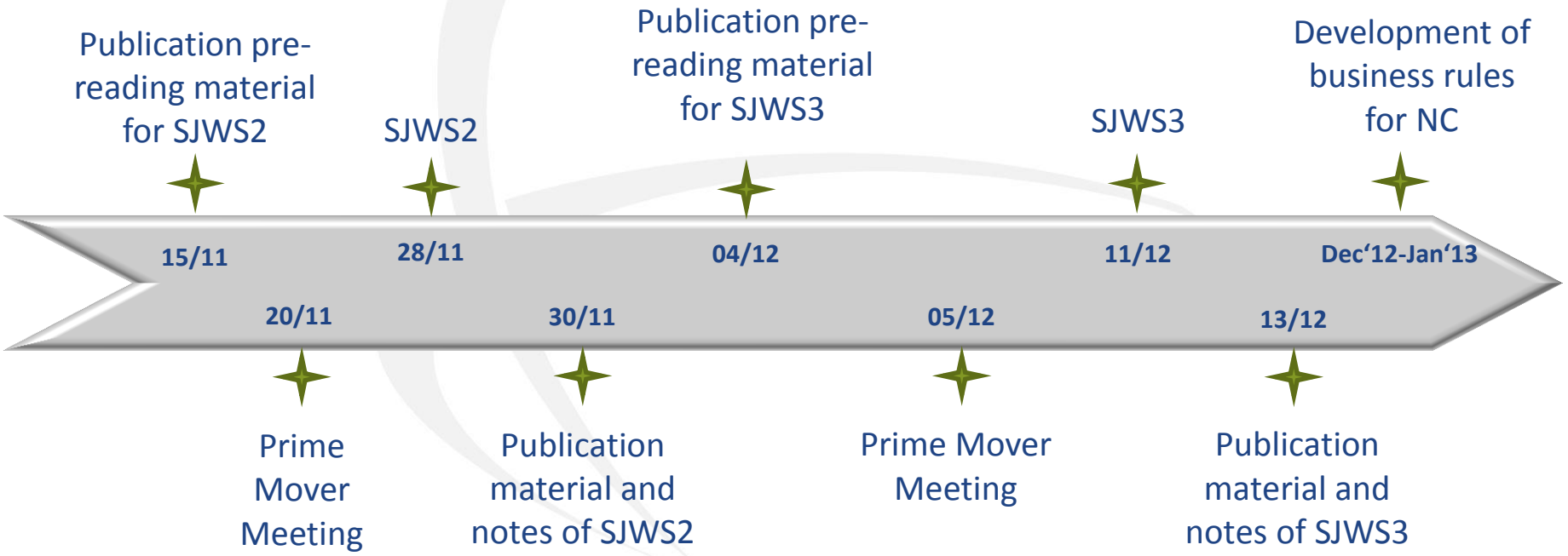
Outlook NC INT Development Process



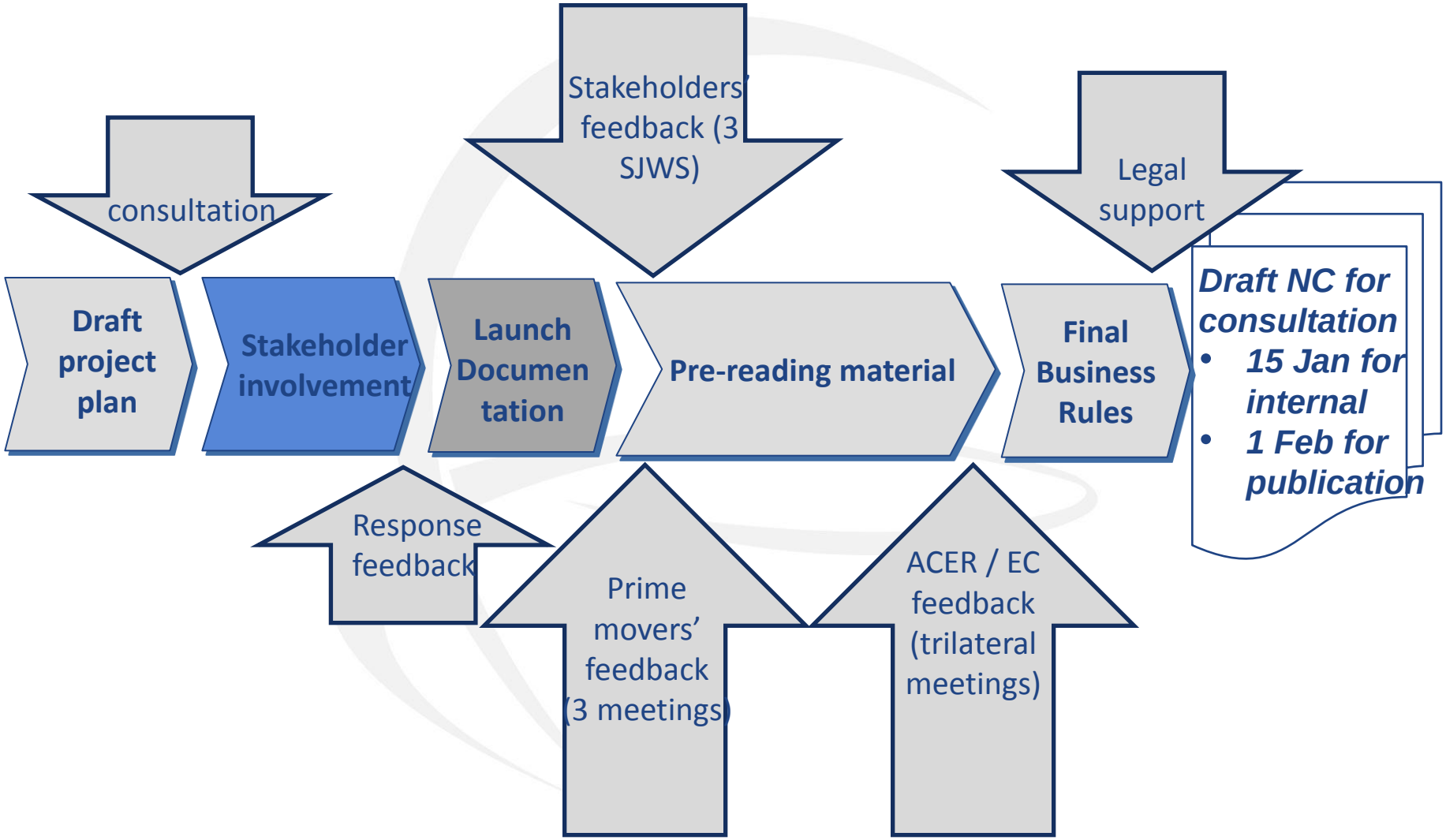
NC development process: activity report



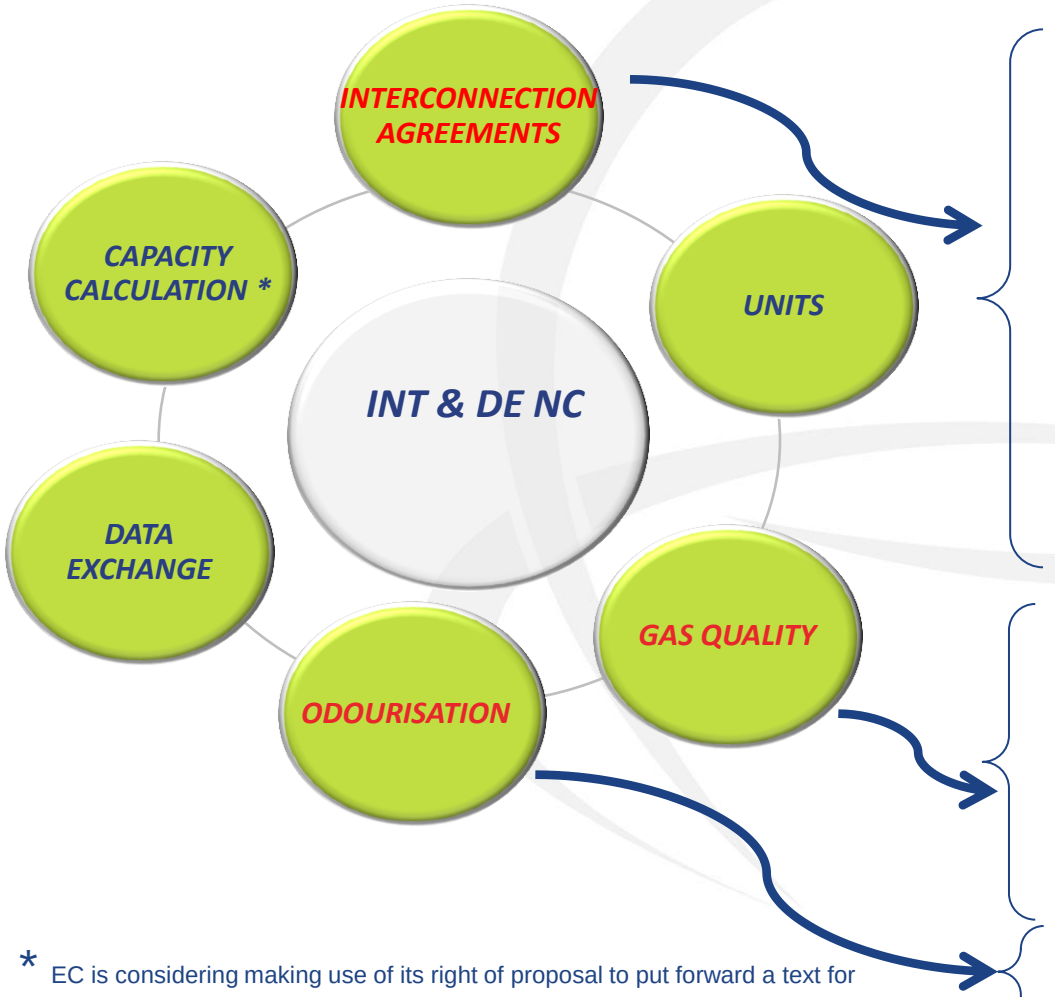
NC development process: upcoming activity



Code development – from topic to draft text



Structure of event



No	Description	Time
1	**Opening** (ENTSOG: P. Panousos) > Welcome / Introduction / Structure of Event > Objectives	10:00-10:15
2	**Interconnection Agreements** Mr Paul Relaxed has a dream "New Network User Ltd." wants to know: > What is an IP and IA? > How is a new IA developed? > How is the Matching process carried out at an IP? > Stakeholders' view > Discussion	10:15-11:15
	Coffee Break	11:15-11:35
3	**Interconnection Agreements** "New Network User Ltd." wants to know: > How do TSO control the flow at an IP? > What are the Measurement Principles at an IP? > What are the rules for the allocation of gas quantities at an IP? > Stakeholders' view > Discussion	11:35-12:05
4	**Interconnection Agreements** "New Network User Ltd." wants to know: > What happens if an exceptional event occurs at one side of an IP? > What are the resolutions for a dispute at an IP? > Stakeholders' view > Discussion Mr Paul Relaxed wakes up	12:05-12:45
	Lunch	12:45-13:45
5	**Transparency related to gas quality** Short Term Monitoring > ENTSOG's view > Stakeholders' view > Discussion Long Term Monitoring > ENTSOG's view > Stakeholders' view > Discussion	13:45-14:45
6	**TSOs cooperation:** Handling gas quality differences > ENTSOG's view > Stakeholders' view > Discussion Odourisation > ENTSOG's view > Stakeholders' view > Discussion	14:45-15:45
7	**Closing remarks** (ENTSOG: P. Panousos)	15:45-16:00
	Coffee Break	16:00-16:15

* EC is considering making use of its right of proposal to put forward a text for comitology in NC CAM.

Objectives of SJWS

> *"The SJWS are working sessions which will enable exchange and development of ideas for inclusion in the network code. During this phase of the network code development activity ENTSOG envisages wide interaction with all participants."*

Detailed thoughts and positions are to be discussed during the 3 SJWS

IMPORTANT STAKEHOLDER INVOLVEMENT -> REFINEMENT DRAFT BUSINESS RULES

Thank You for Your Attention

Panagiotis Panousos
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WWW: www.entsog.eu

NC Interoperability

SJWS

Hendrik Pollex, ENTSOG

Walter Crommelin, GTS

Wolfgang Heinrichs, OGE

Brussels, 14.11.2012

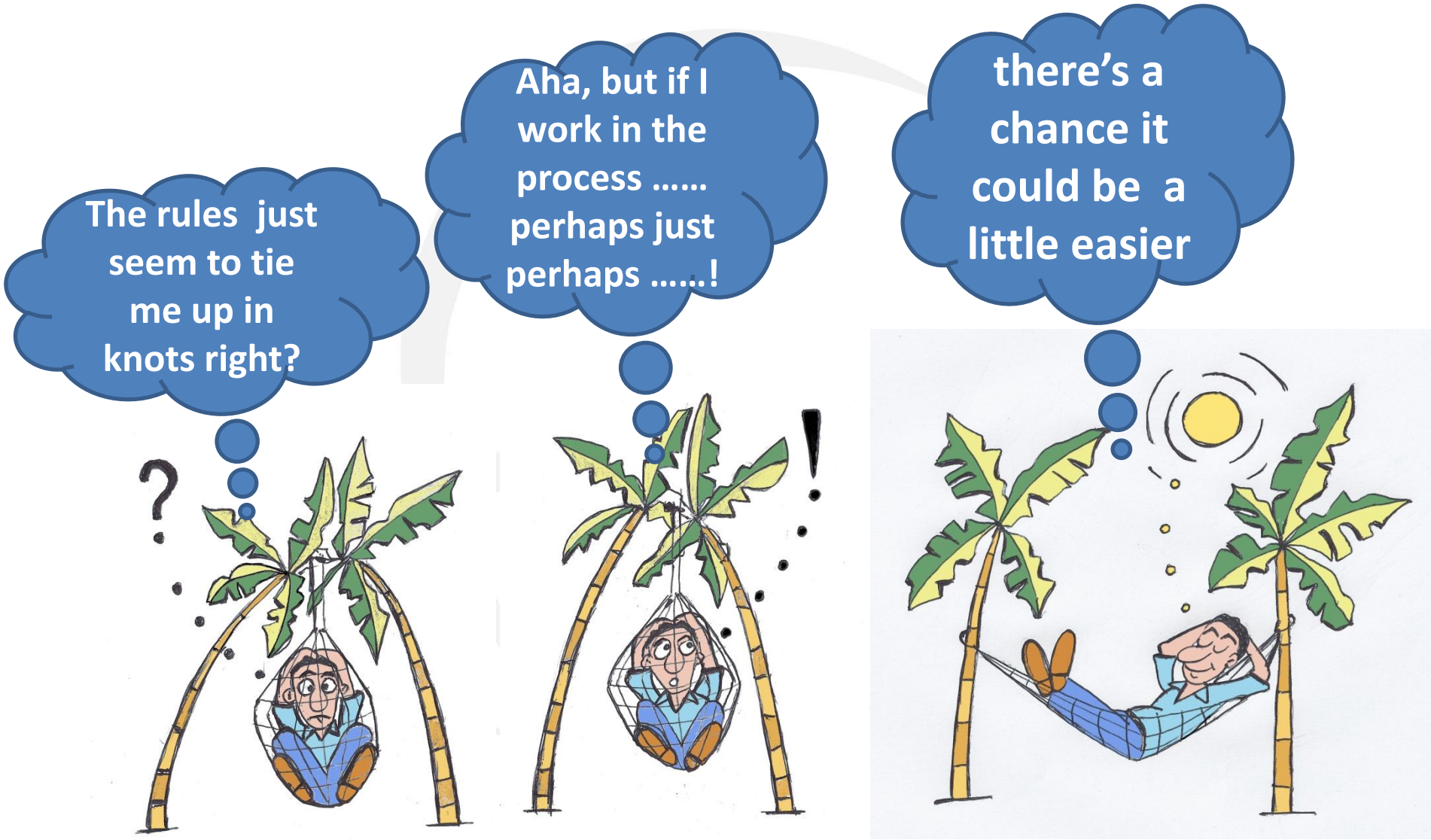
Business Rules for Interconnection Agreements

NC Interoperability BR for section Interconnection Agreements

- What is an IP and how is it defined?
- How is an IA developed and how an existing one been adapted?
- How is the matching process carried out?
- How do TSOs control the flow at an IP?
- What are the measurement principles for an IP?
- What are the rules for allocation of gas quantities for an IP?
- What happens if an exceptional event occurs at one side of an IP?
- What are the rules for a dispute about an IP?
- Summary of the major steps

In between Stakeholder's views and discussions

Mr Paul Relaxed has a dream



What is an Interconnection Point

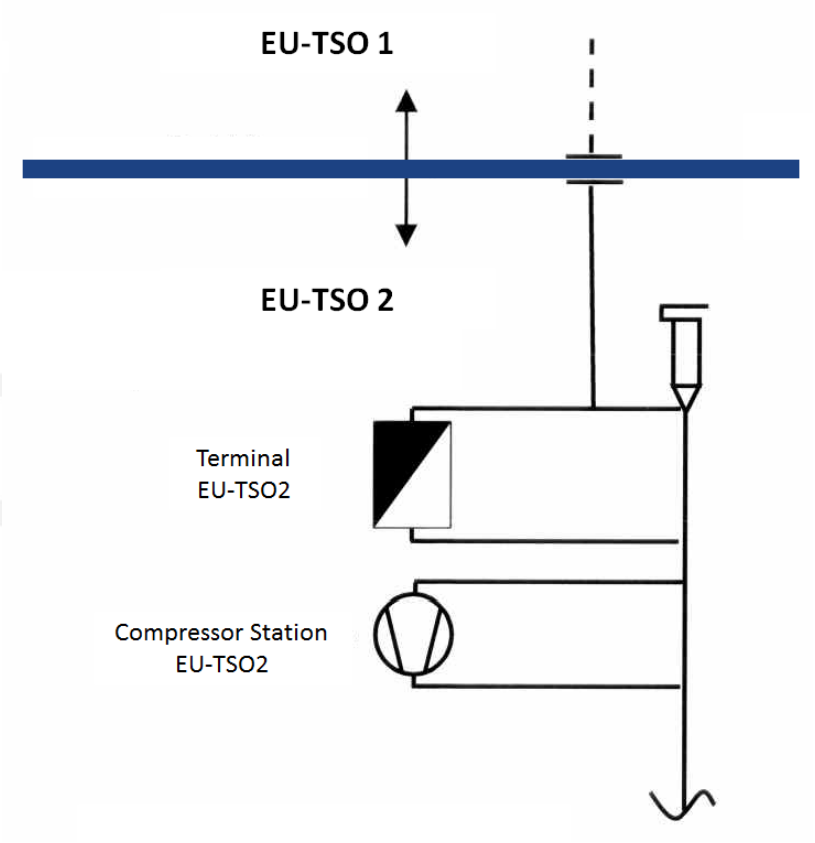
> **DEFINITION acc. to CAM NC**

'Interconnection Point' means a cross-border interconnection point, whether it is physical or virtual, between two (2) or more Member States as well as interconnection between adjacent entry-exit systems within the same Member States, in so far as these points are subject to booking procedures by Network Users being active at that Interconnection Point.

- **Consists of the following main parts**
  - Pressure reduction and control equipment
  - Flow control equipment
  - Gas volume measurement equipment
  - Gas quality measurement equipment
  - Telemetry equipment
  - Compressor where needed

Interconnection Point in pictures

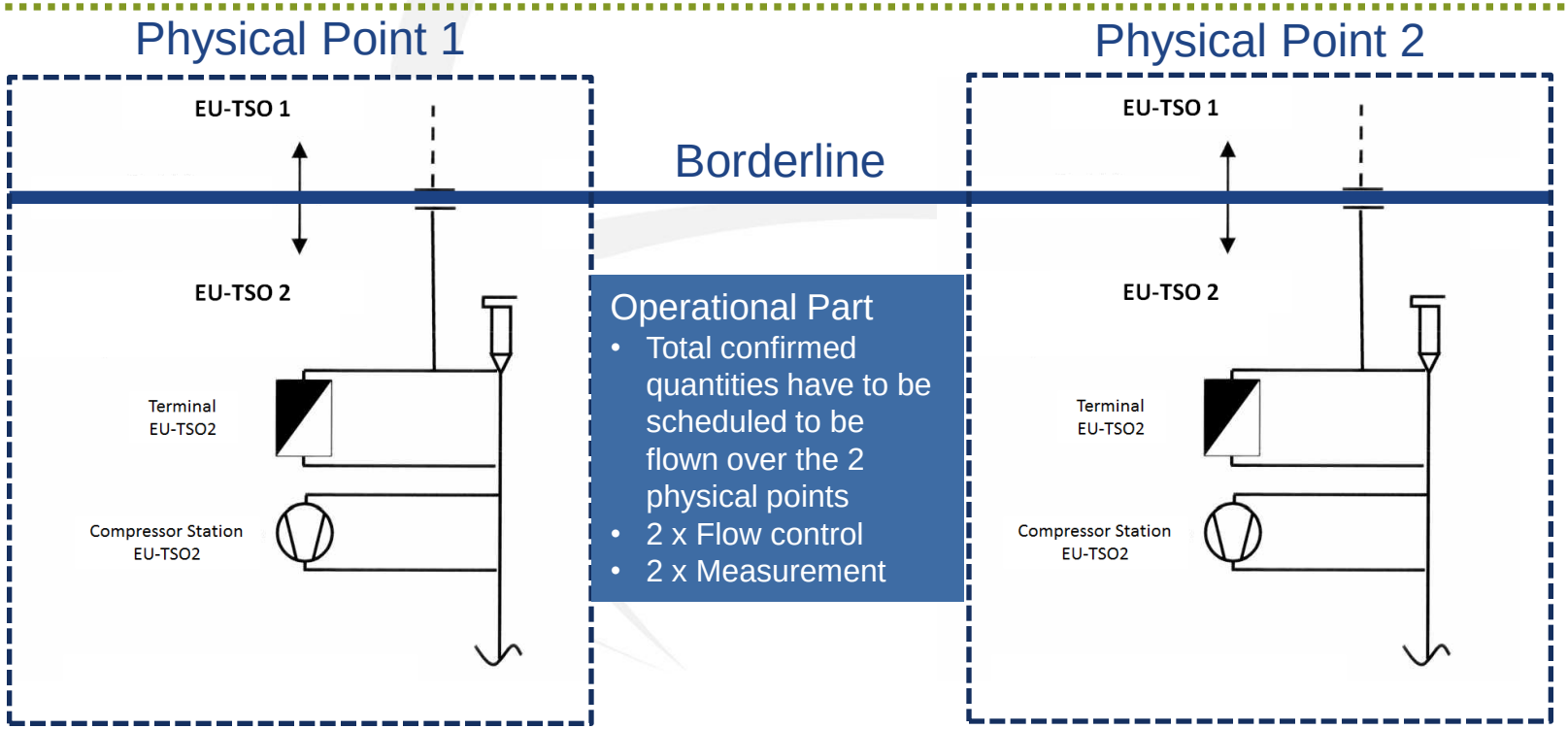
Physical Interconnection Point



Virtual Interconnection Point

Commercial Part
- IA
- capacity booking
- nomination
- matching
- allocation

Per VIP, not per each Physical point

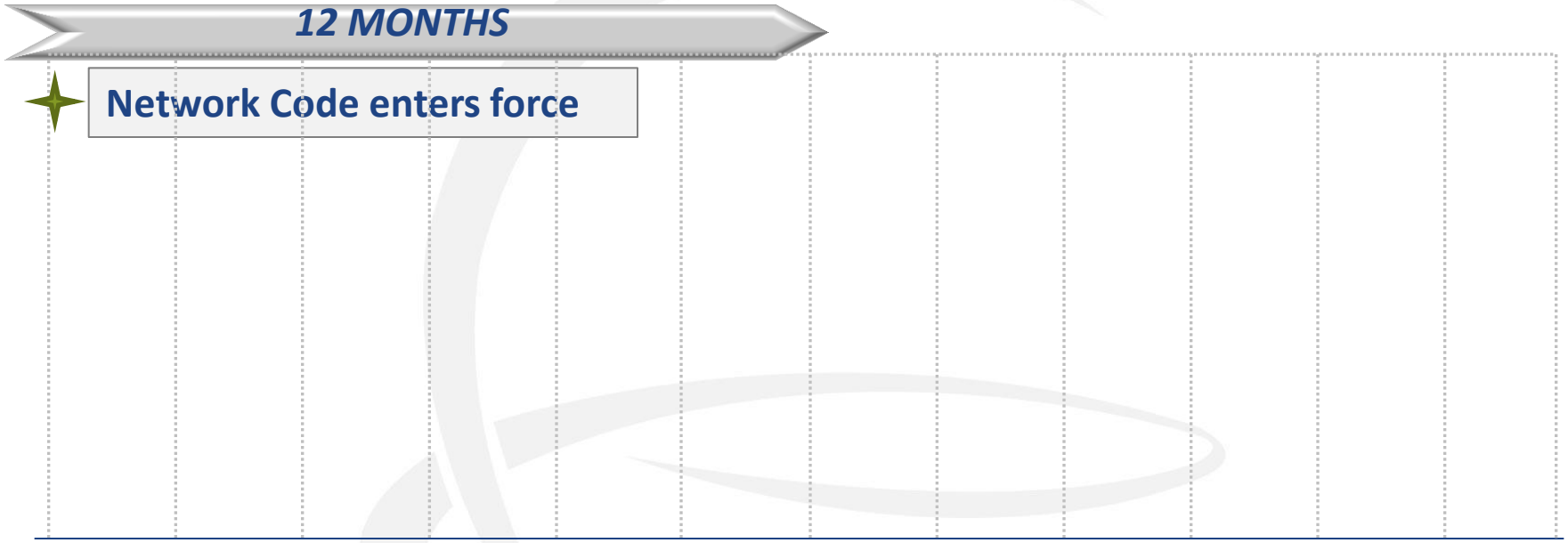


Operational Part
- Total confirmed quantities have to be scheduled to be flown over the 2 physical points
- 2 x Flow control
- 2 x Measurement

Questions: Interconnection Point

Are there any questions so far?

When should IAs be in place?



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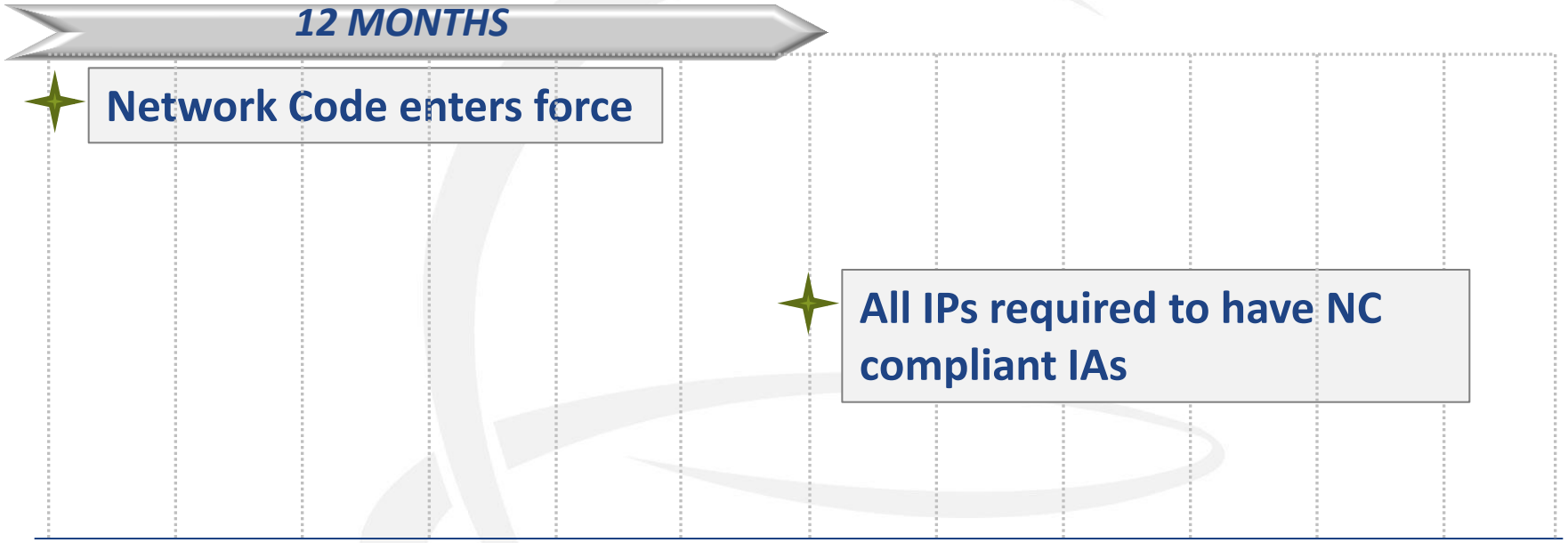
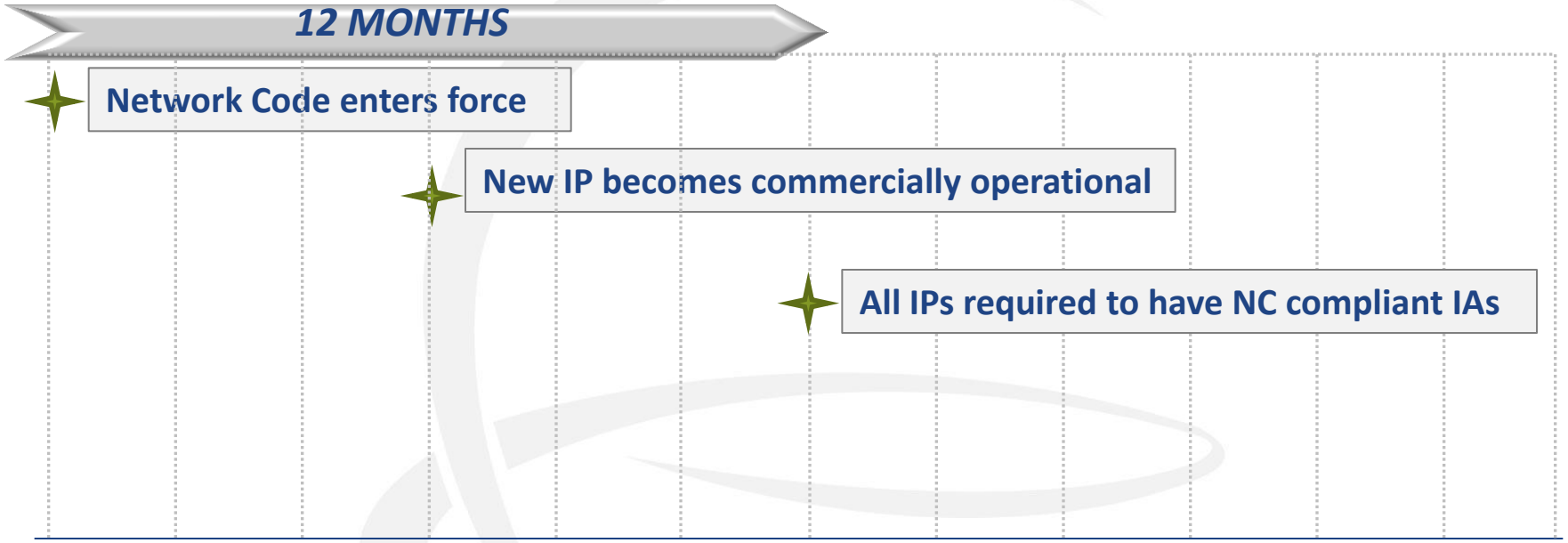


Within 12 months after the Network Code enters force, TSOs should have:

- Reviewed their existing IAs against NC requirements
- Where necessary, adapted their existing IAs to be NC compliant
- Signed NC compliant IAs for IPs which currently have no IA
- Submitted all IAs (and details of any amendments) to their NRAs

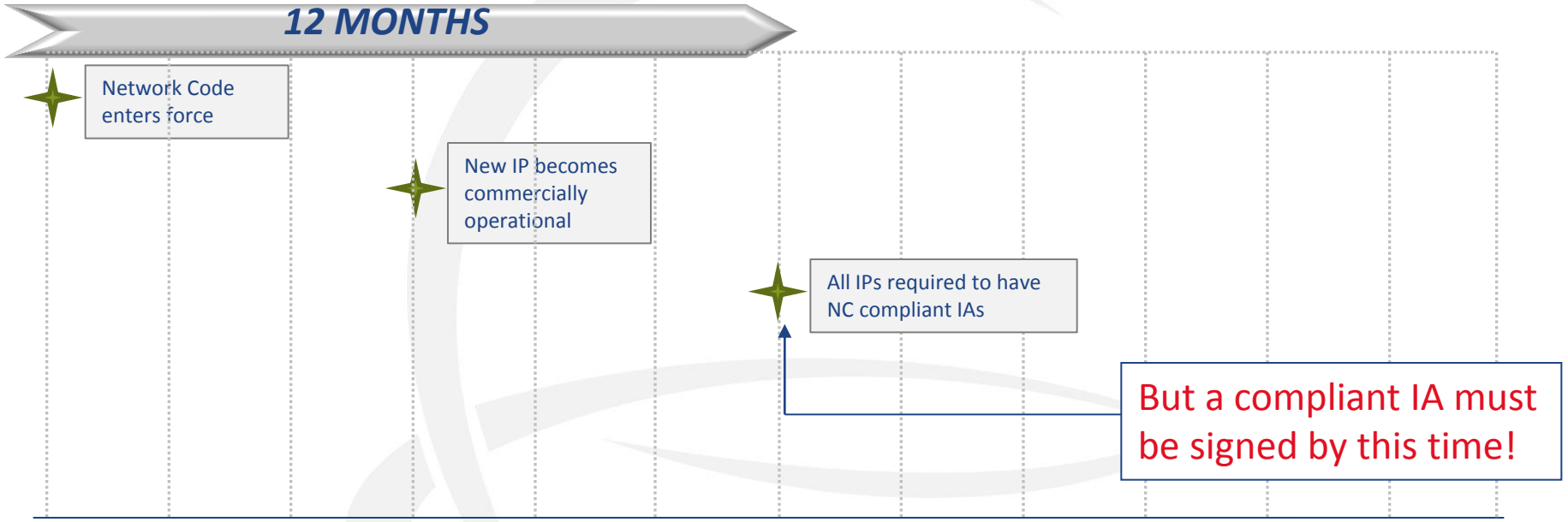
When should IAs be in place?



If a new IP becomes commercially operational during this 12 month period:

- TSOs should endeavour to sign a NC compliant IA before first gas flow
- TSOs and Network Users may agree for gas to start flowing:
  - with a non-NC compliant IA, or
  - without an IA in place

When should IAs be in place?



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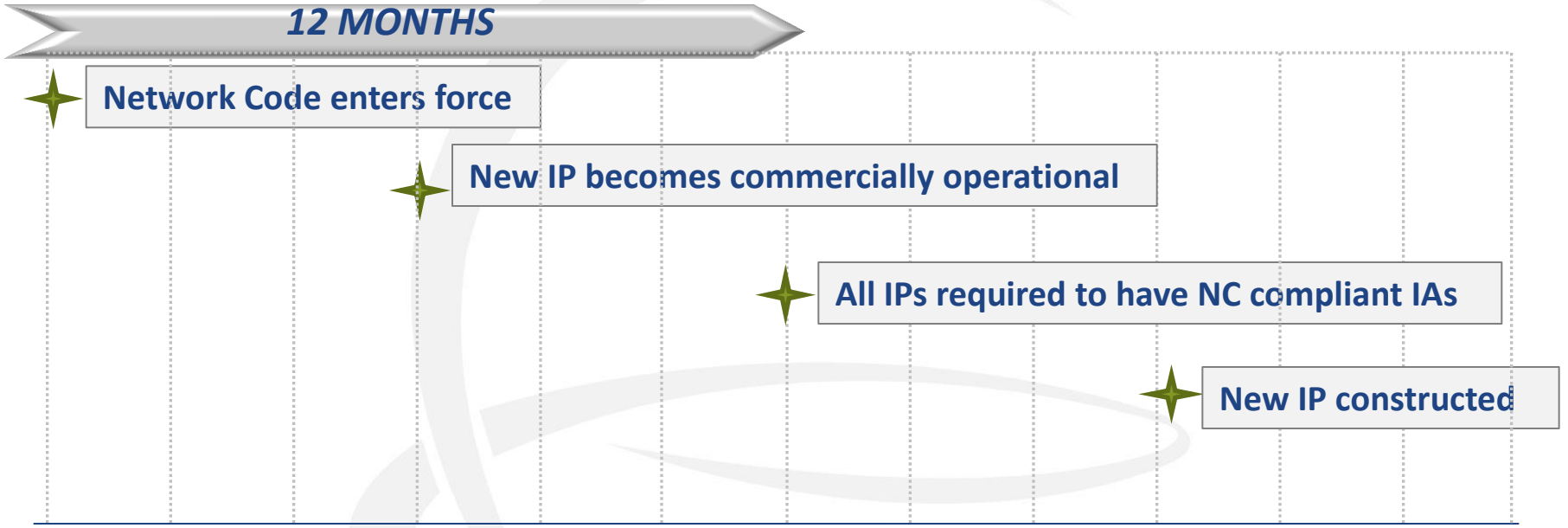


Where new IPs are constructed after the 12 month period:

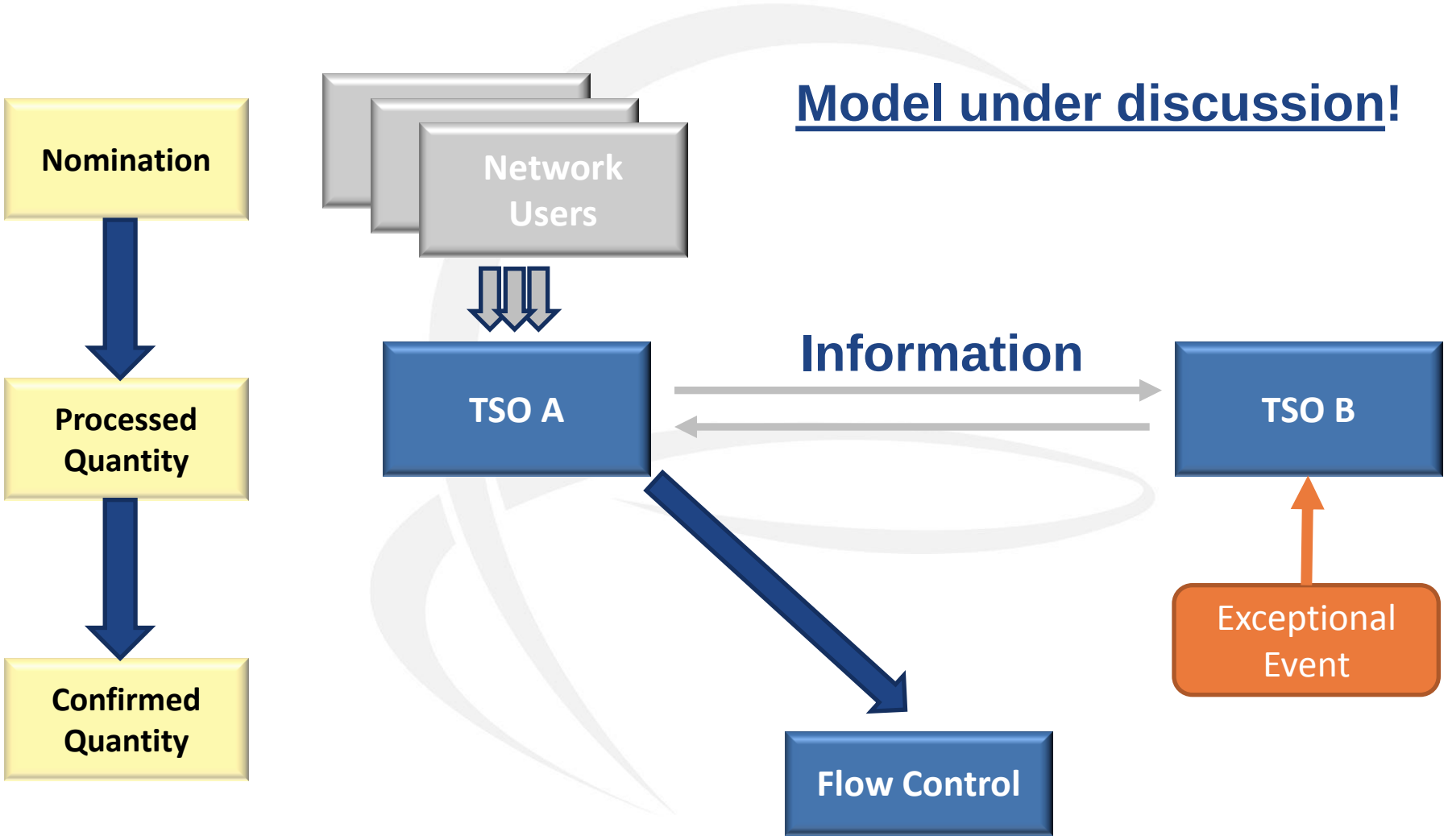
- The IP should not start commercial operation unless a NC compliant IA has been signed
- TSOs should agree a plan for the timely development and conclusion of the IA

Questions: IA Development / Adaption

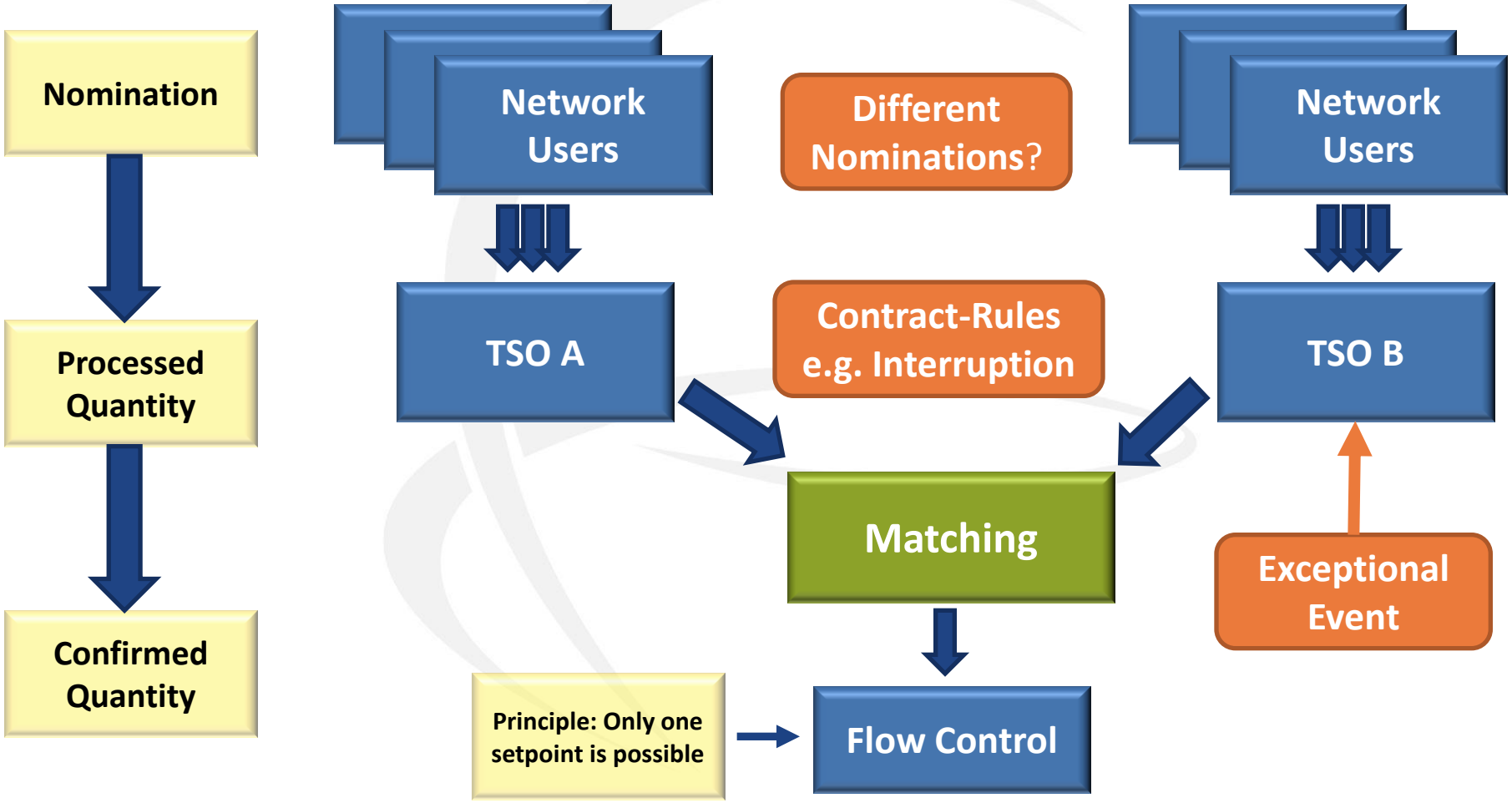
Are there any other details about the IA development process that should be included in the NC?

Should certain terms of adapted IAs be communicated to Network Users? If so, which ones?

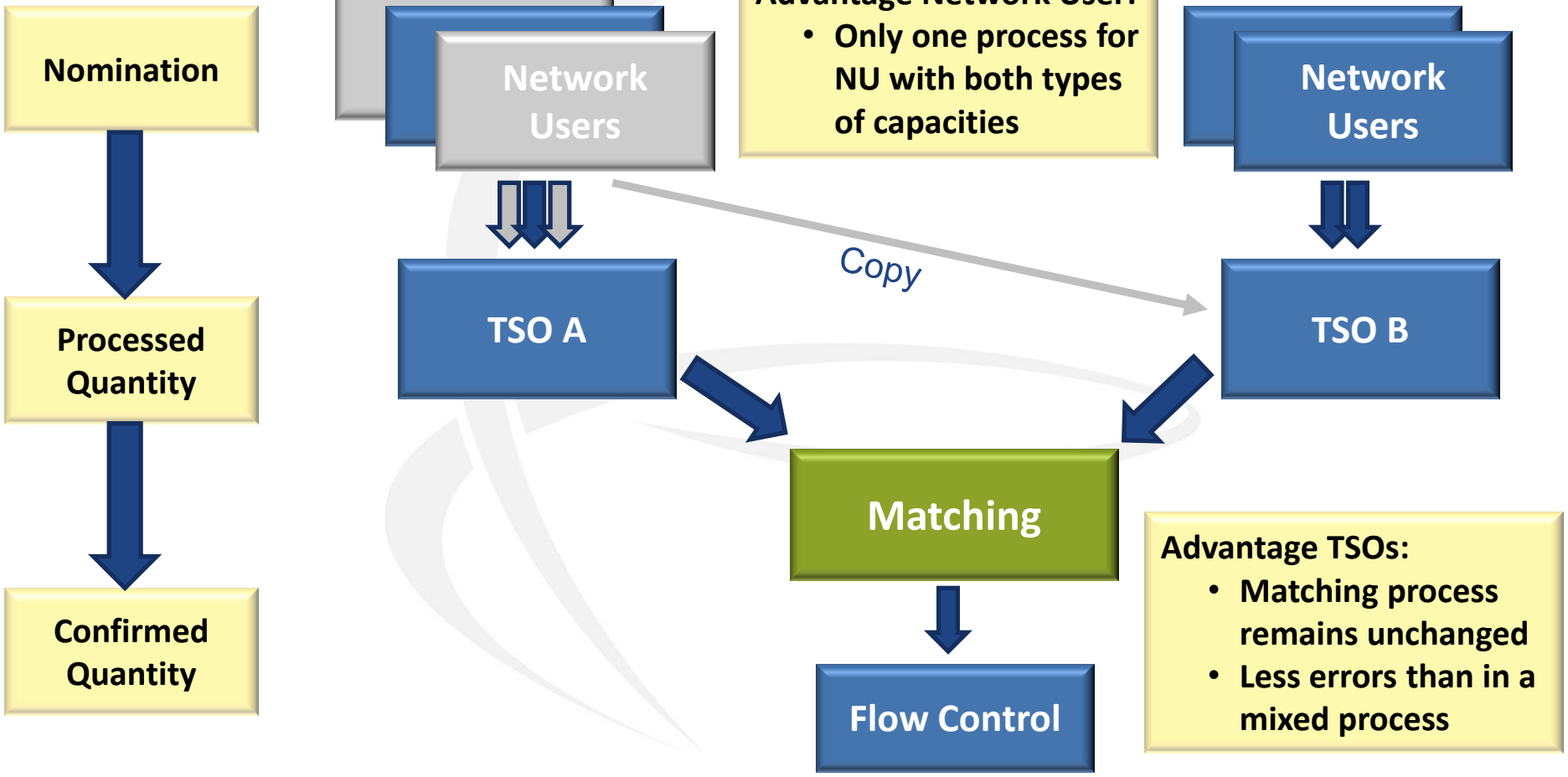
Matching: Bundled capacity products



Matching: Why is it needed?



Matching of bundled and unbundled products



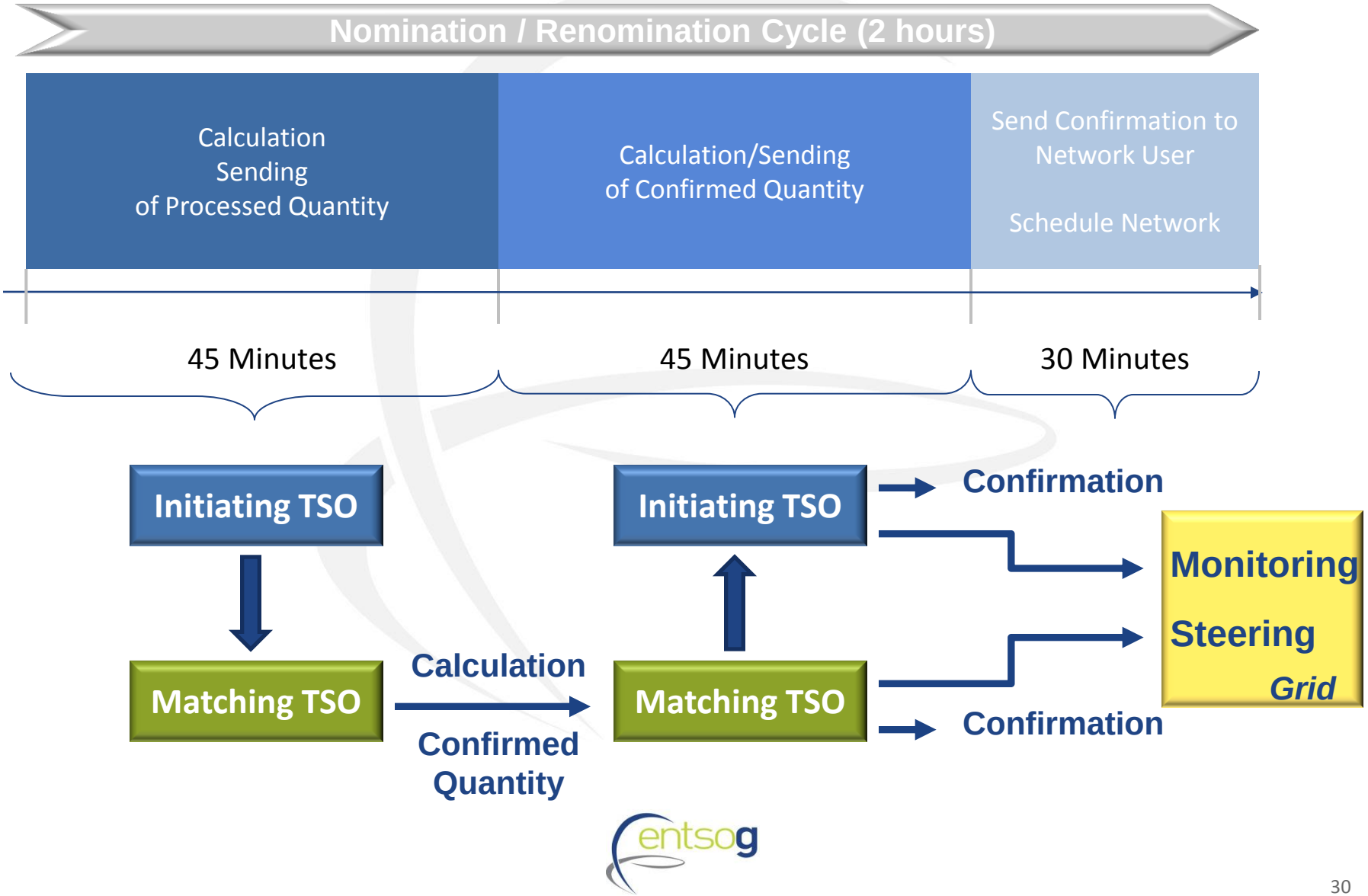
Matching

General Provisions

> All TSOs whose systems are connected at an IP shall implement a Matching Process

> The Matching Process shall describe
- Communication and processing of the relevant data among the TSOs
  - Roles (Initiating/Matching TSO)
  - Timing
  - Data formats
- Calculation of the Processed Quantities and Confirmed Quantities of Network Users
  - Matching Rules
  - Reducing interruptible contracts if necessary

Matching: Timing & Roles



Matching Rule

- Matching Rule has to be clearly defined
- Result has to be the same for both sides of the flange for each pair of Network Users
- The sum of all Confirmed Quantities is the basis for Flow Control
- Default Rule: „Lesser Rule“

Examples: Results of Lesser Rule		
Processed Quantity A	**Processed Quantity B**	**Confirmed Quantity**
100	**100**	**100**
-100	**-120**	**-100**
100	**80**	**80**
100	**-50**	**0**
100	**Missing or wrong code**	**0**

Matching: Data content

Minimum required data content
Sender and recipient Identification
IP Identification
Party(s) / Counterparty(s) NU Portfolio Identification
Start (and end) Time for which the matching is made
Delivery Period (Gas Day)
Processed Quantity
Confirmed Quantity in kwh/d (daily regime) or kwh/h (daily regime with WDO)

Questions: Matching

Are there any other details about the matching process that should be included in the NC?

Do you agree to the default rules (e.g. matching rule; roles; timing)?

Stakeholder views on Interconnection Agreements

Thought provoking statements for discussion purposes only

Presenter: Kees Bouwens
'Prime mover' on behalf of OGP
✉kees.bouwens@exxonmobil.com

Stakeholder views on Interconnection Agreements

Scope

- Interconnection Agreements (IAs) apply to TSOs in dealing with interconnection points (IPs)
- IAs do not apply to SSOs, LSOs, DSOs, producers and consumers connected to the TSO system
- However, it would be wrong to consider IAs as a matter exclusively for TSOs, or limited to IPs only
- IAs should be developed in a way that supports interoperability with other connections to the TSO system
  - Connection agreements with production-, storage- and LNG- facilities, and with DSOs and end-users may be different from IAs, but IAs should be compatible

Stakeholder views on Interconnection Agreements

Design Process

- Design process and IAs should be transparent
  - Network users could be directly impacted by provisions in IAs such as matching and allocation rules
  - Allow other parties to highlight areas where IAs may not be compatible with other connection agreements
  - Should also apply to modification process
- IAs should be designed towards a target model
  - Objective is harmonisation of rules
  - Consistent with CAM and Balancing NCs
- Prefer that NC defines rules instead of options and procedures

Stakeholder views on Interconnection Agreements

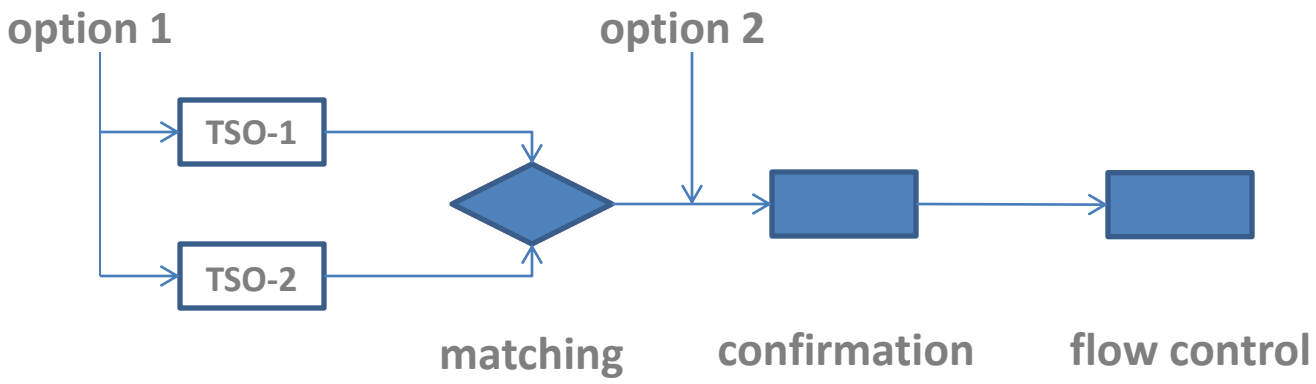
Example: Flow Control

- **Text of section 2.3.2. does not provide a clear set of rules:**
  - **TSOs shall agree on the amount and direction of gas flow**
  - **Agreed amount and direction shall take account of:**
    - **Results of the Matching Process,**
    - **Including balancing account corrections,**
    - **Any Exceptional Events,**
    - **Any flow control agreements agreed between the TSOs for the purpose of ramp-up, ramp-down, minimum flow, ...**
  - **TSOs may alter agreed amount and direction of gas flow in order to comply with:**
    - **Safety requirements, Security of supply requirements, Emergency Situations, other reasons specified in national rules**

Stakeholder views on Interconnection Agreements

Example: Matching and Confirmation

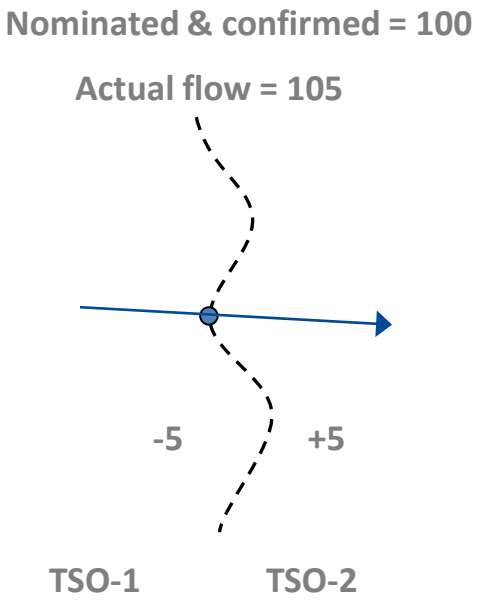
- Integration of process for bundled and unbundled products:
  - Option 1: User of bundled product submits 2 identical nominations to both TSOs which enter the matching process for unbundled products
  - Option 2: User of bundled product submits single nomination which bypasses matching process



Stakeholder views on Interconnection Agreements

Example: Allocation Rules

- Existing rules allocate difference to:
  - TSO (OBA);
  - Balancing network user;
  - All network users, pro-rata
- Rules may be different on either side of IP
- Suggestion: Target model is OBA only
  - Consistent on both sides of IP
  - Allows all users to manage imbalances
  - TSOs to agree on settlement in IAs
  - Compatible with bundled hub-to-hub services



Stakeholder views on Interconnection Agreements

Other Suggestions

- **Further suggestions to enhance interoperability:**
  - **Include in the scope a common approach in calculating capacity at IPs, including:**
    - **Baseline capacity (technical firm capacity)**
    - **Additional capacity (§ 2.2 of Annex I to Reg. 715/2009)**
    - **Interruptible capacity (+ how and when this is interrupted)**
  - **Agreement by TSOs to accept each other's network users without additional registration/licensing**

Thank you for your attention !

Interconnection Agreements

Stakeholder's Joint Working Session 1

DISCUSSION PANEL

Brussels, 14 Nov 2012

Coffee break

General principles for Flow Control

Goal:
Facilitate a controllable, accurate, predictable and efficient flow across the IP for the benefit of both TSOs and NUs

Requirement:
TSOs shall agree how to steer the flow and use their reasonable endeavours to minimize the deviations from the agreed flow

Process for efficient Flow Control

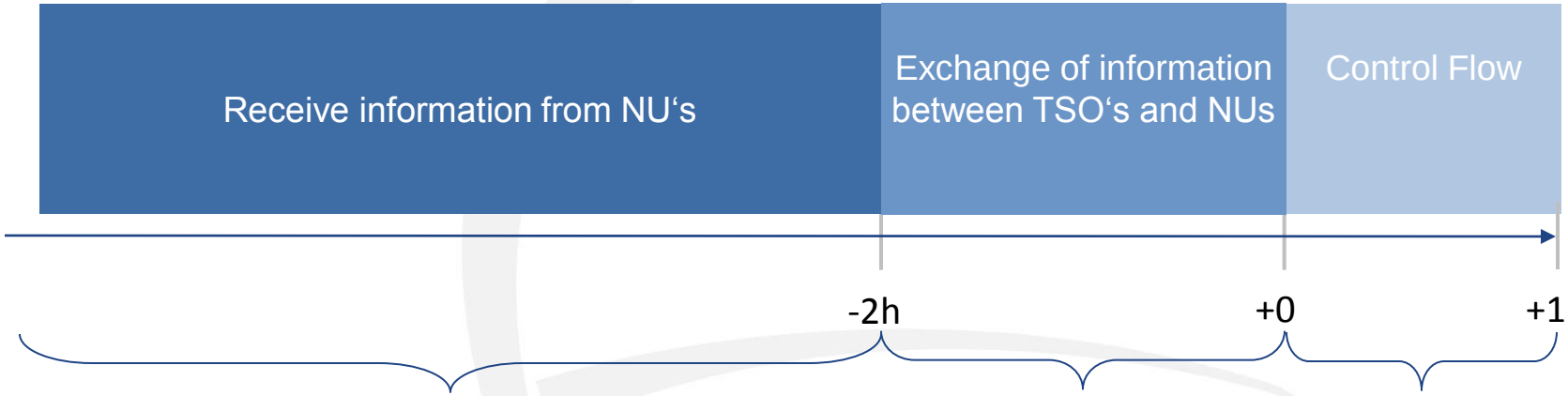
Inputs:

- Regular activities:
  - matching process
  - correction for balancing accounts
  - arrangements for minimum flow, direction reversal, ramp-up, ramp-down
- Irregular activities:
  - Exceptional Events
  - Security of Supply/Emergency issues
  - Safety issues
  - Other National Rules

Outputs:

- An accurate flow in order to minimise imbalances in the transportation networks.
- A stable flow to ensure an efficient use of the transportation networks.
- Pressure that meets the contractual obligation

Process for Flow Control: Timing



Auction Results

(Re)Nominations

Overnominations

Matching Process

Balancing Account Corrections

Flow Arrangements

Exceptional Events

Security of Supply

Safety Issues

Responsibilities for Flow Control

All involved TSO's are responsible for ensuring that the inputs are delivered in an accurate and timely manner.

The TSO controlling the flow control equipment is responsible for the actual steering of the flow to the agreed upon target.

Questions: Flow control

Do you consider that agreed details on flow control might affect Network Users and if yes, how?

Are there any other rules concerning flow control that you consider should be included?

General principles for Measurement of Gas Quantity and Quality in an IA

Goal:
Accurate and reliable Measurements for use in Flow Control and Allocation/Billing

Requirement:
Clear and well defined measurement principles and responsibilities for the involved parties.

Measurement Principles process

Inputs:

- International/European standards
- National Regulatory Frameworks
- National Rules and Regulations

Outputs:

- An accurately measured (energy) gas flow:
  - so as to minimise imbalances in the transportation networks
  - for use in the billing process.
- An accurately measured gas quality:
  - as input for the for energy gas flow
  - to ensure the safety of the transportation networks and end users.

What should be included in the IA?

- Description of the metering station and equipment used
- Gas quality parameters to be measured including for each measurement:
  - range, uncertainty, frequency, units, standards used
- Procedures and methods for calculating parameters not directly measured
- Procedures and methods for the total uncertainty of the energy determination and validation
- Conversion factors
- Measurement validation and quality assurance arrangements
- Data exchange including signals and alarms
- Rules for dealing with equipment failures and errors

Responsibilities

All involved TSO's are responsible for ensuring that the measurement equipment complies with the relevant standards.

The TSO owning the measurement equipment is responsible for:

- Installation, operation and maintenance of the measurement equipment
- Measuring the flow to the agreed upon accuracy
- Providing the adjacent TSO's with all relevant information and data concerning the measurements upon their request

Default rule

Proposal: The application of National, European and International Standards' measurement principles relevant to the type of equipment will be the default rule.

Relevant Standards:

> For accountable measurements: EN 1776 "Functional Requirements for Gas Measuring Systems"

Questions: Measurement Principles

Should the NC contain more standards?

Do you agree with the above proposals for measurement principles that should apply at an IP?

What are the rules for the allocation of gas quantities for an IP?

Option A

- **Operational Balancing Account OBA**
  - Allocation provided by the TSOs
  - Steering difference allocated to OBA
  - Allocation for NUs is equal to the confirmed quantities
  - Default rule

Option B

- **Balancing Network User**
  - Allocation provided by the TSOs
  - Steering differences plus confirmed quantities are allocated to the Balancing NUs
  - Allocation for the Non-Balancing NUs is equal to their confirmed quantities

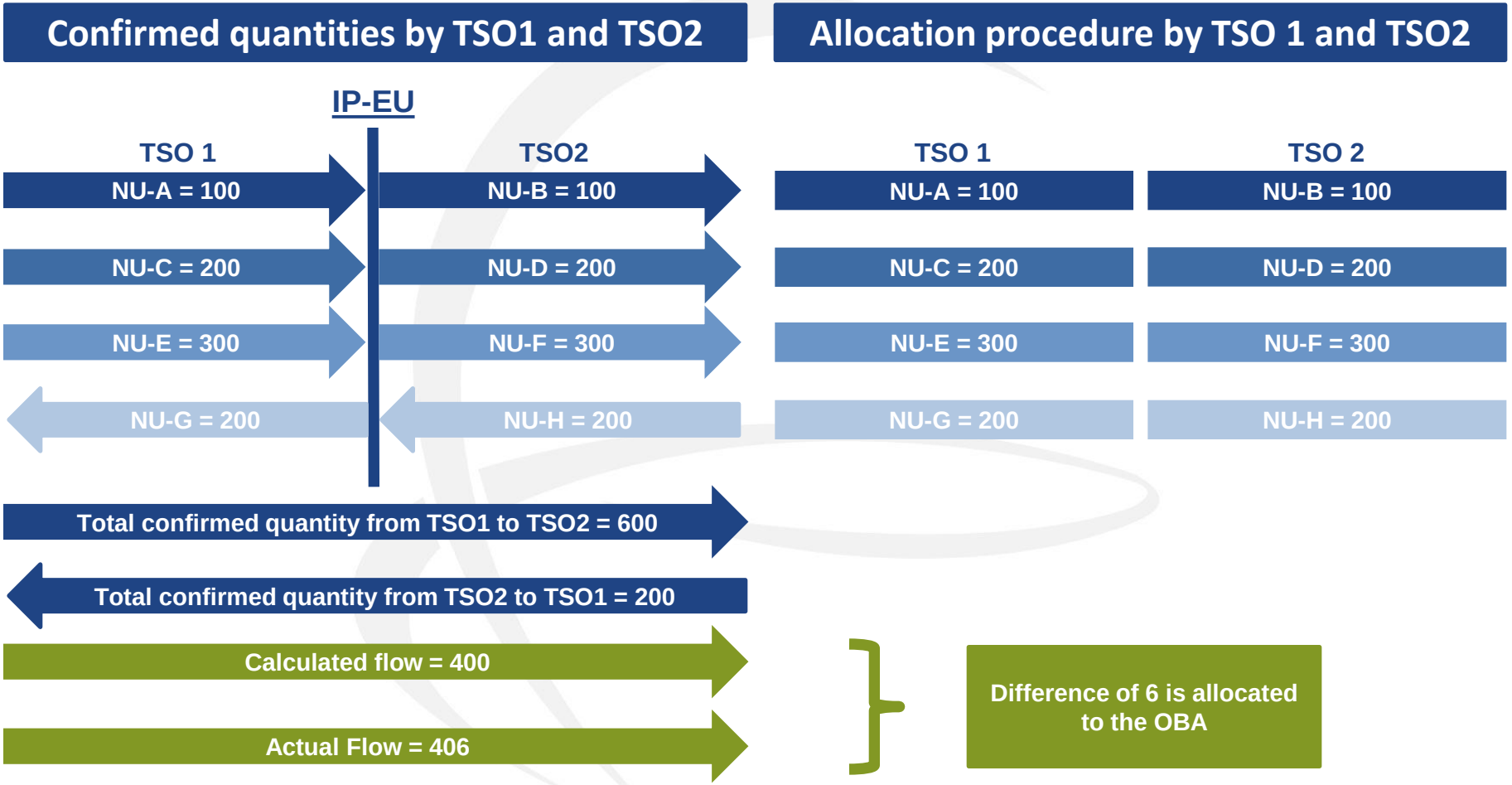
Option C

- **Pro-Rata**
  - Allocation provided by the TSOs
  - The metered quantities are allocated to NUs in proportion to their Confirmed Quantities.
  - Quantities in the opposite direction of the resulting physical flow will be equal to the confirmed quantities.

Option D

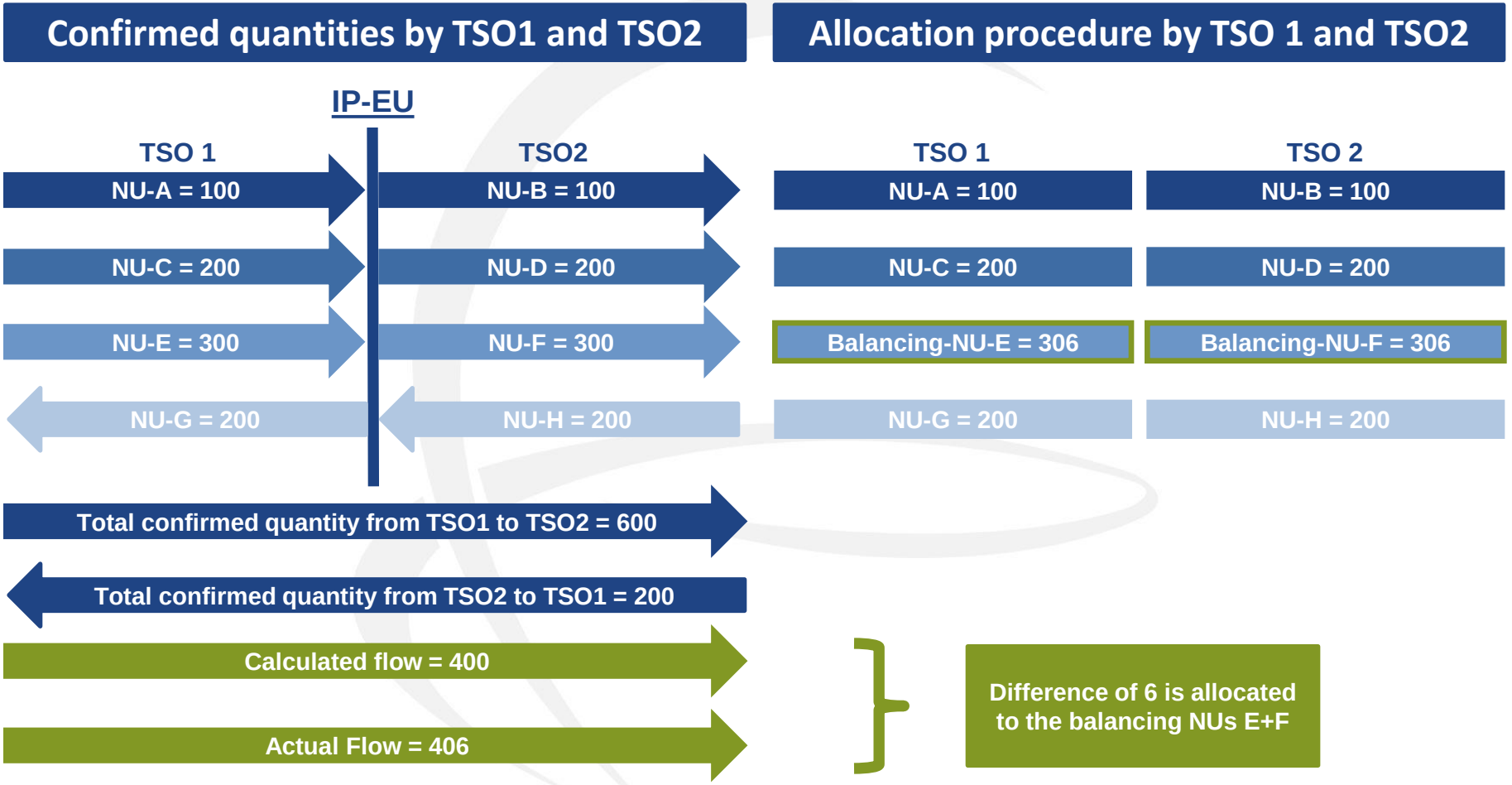
- **Agent**
  - Allocations provided by a third party agent
  - Third party agent is acting on behalf of the NUs and
  - In accordance with rules agreed between the agent and the relevant NUs

Allocation Rule “OBA”



Same as in case 1 plus one nomination in the opposite direction of the physical flow. The corresponding flow is accordingly lower. The difference between actual flow of 406 and calculated flow of 400 is allocated to the OBA. The allocation for all NUs is equal to their confirmed quantities.

Allocation Rule “Balancing Network User”



The difference between actual flow of 406 and calculated flow of 400 is now allocated to the balancing NU instead to an OBA. The allocation for the non-balancing NUs is equal to their confirmed quantities.

Questions: Allocation Rules

Are there any questions or remarks concerning the BR for allocation?

Exceptional Event - I

Definition

- **Unplanned (short term) event that, for a limited period, causes available transport capacity to be less than the sum of confirmed quantities related to unforeseen problem in transmission system (e.g. compressor trip) or consequence of gas quality problem**

General Provision

- **Obligation to inform each other**
- **Applied on IPs, applicable on other entry/exit points if agreed by concerned TSOs**

Exceptional Event - II

Communication

- Fast and simultaneous to all concerned parties
- Between concerned TSOs:
  - Keep inform without delays and upon resolution
  - About nature, expected duration, and possible impacts on quantities of gas transported
  - Default means: phone call (information), reliable writing telecom (confirmation)
- To concerned (active on IPs) Network Users:
  - As soon as reasonably practicable and upon resolution
  - About nature, expected duration, and any consequences on confirmed quantities
  - Default means: reliable writing telecom
- To other Network Users:
  - During event and after resolution
  - About nature, expected duration
  - Default means: web site

Questions: Exceptional Event

What are your views on the proposed policy rules?

Resolution of IA disputes

- TSOs should first endeavour to resolve any dispute arising out of an IA by negotiation
- Where this cannot be achieved, IAs should provide for ‘Expert Determination’
- Existing rules should apply until the dispute is resolved

Expert Determination

IAs should define:

- Circumstances under which a matter may be referred to an expert
- Process for appointment
  - Including if TSOs cannot agree who it should be
- Timescales for investigation and reporting
- Apportionment of the expert's costs between TSOs
- TSOs should submit to the expert's determination as being final and binding

Questions: IA Dispute Resolution

Do you agree that independent parties should settle disputes between TSOs arising out of IAs?

Should TSOs appoint independent parties on a case by case basis ?

Major steps through the introduction of BR for IPs

- All European TSOs are involved
  - On the same level
  - Without regional distinction
- All IPs will have to have an IA in force
- This is a legally binding obligation
- All IAs will have a minimum set of mandatory terms
- OBA will be the allocation rule as long as NUs don‘t want to have something different!
- In depth involvement of all stakeholders leads to
  - Better mutual understanding of the counterpart
  - Better common understanding of principles and terms
  - Better business relationship
- Proved common business practises will of course being taken over like
  - Unlimited matching cycles
  - Allocation Rules
  - Etc.

Thank You for Your Attention

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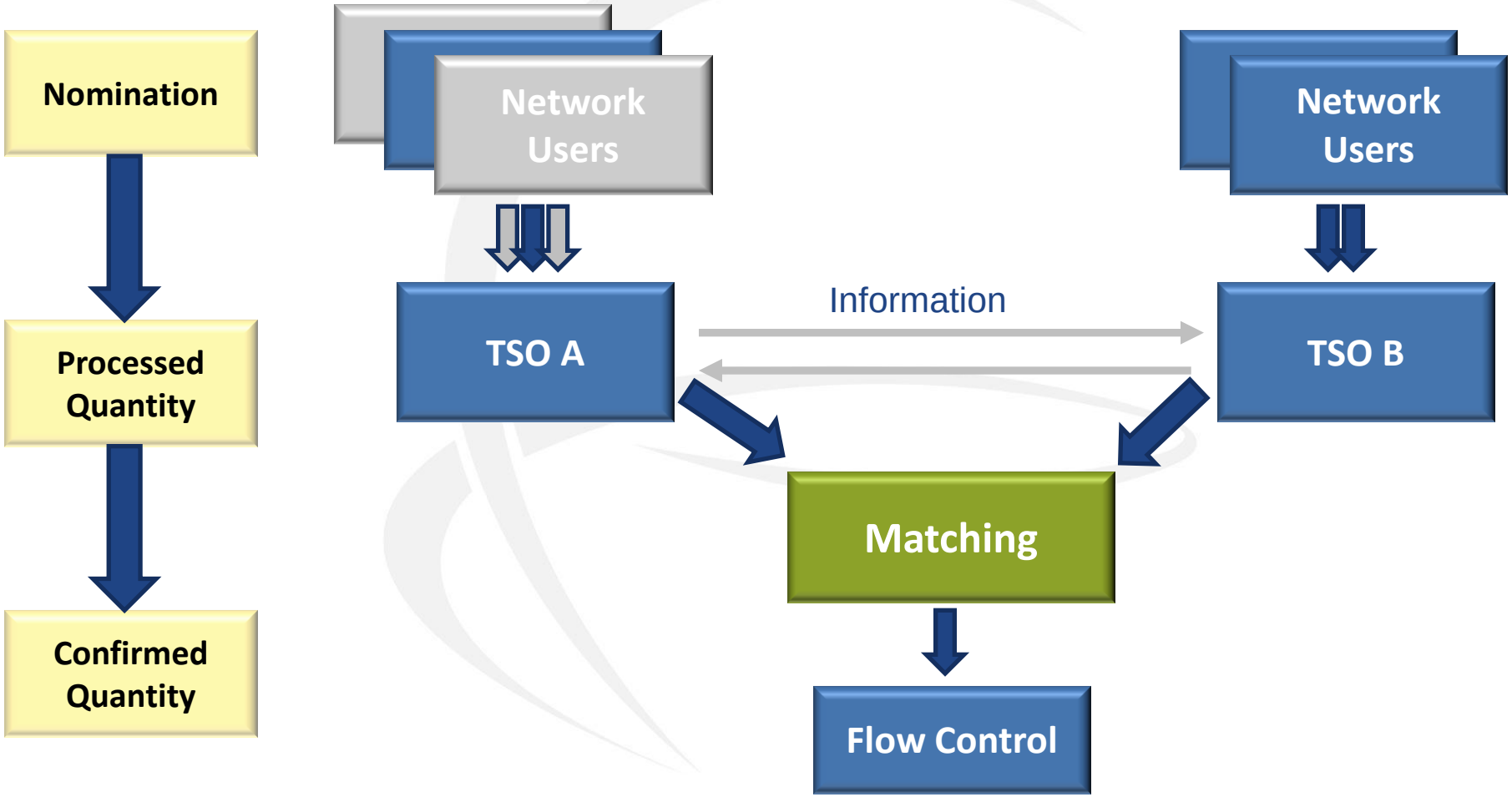
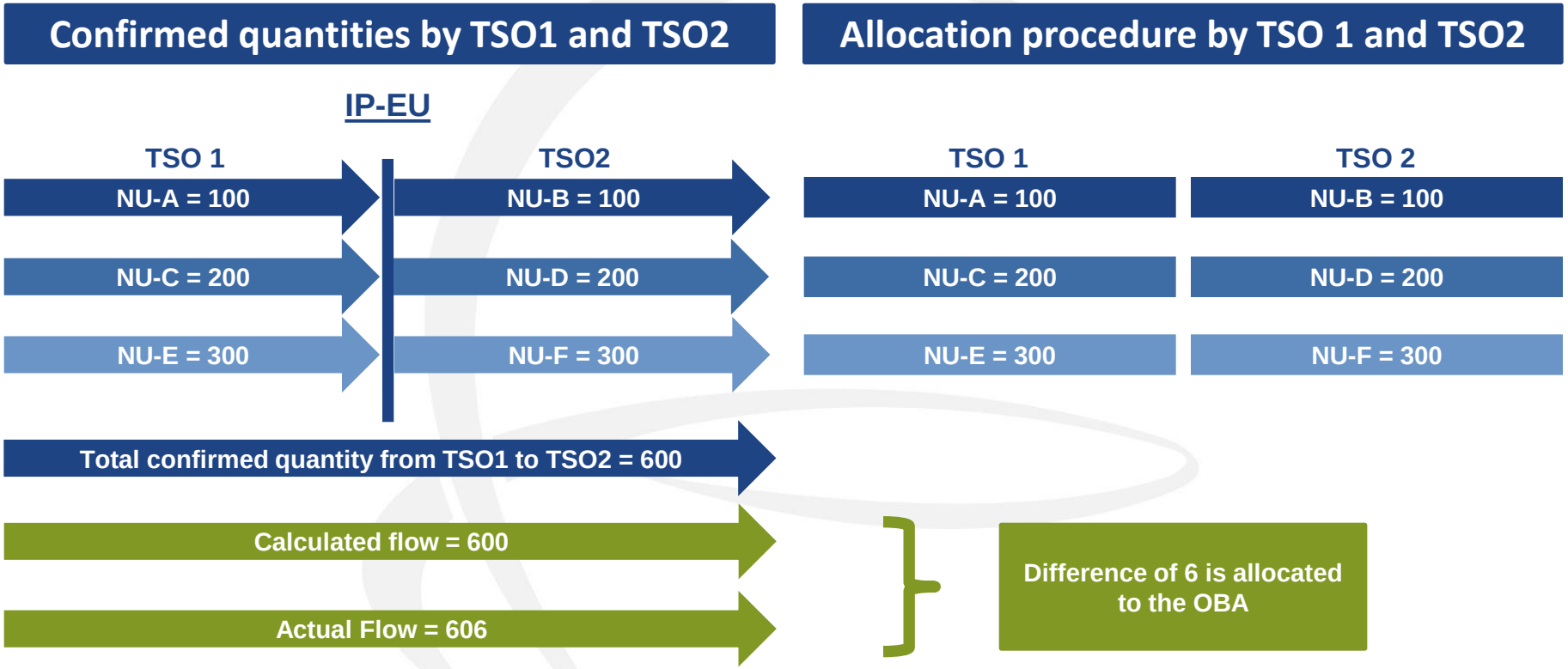
Matching: Transition Period I

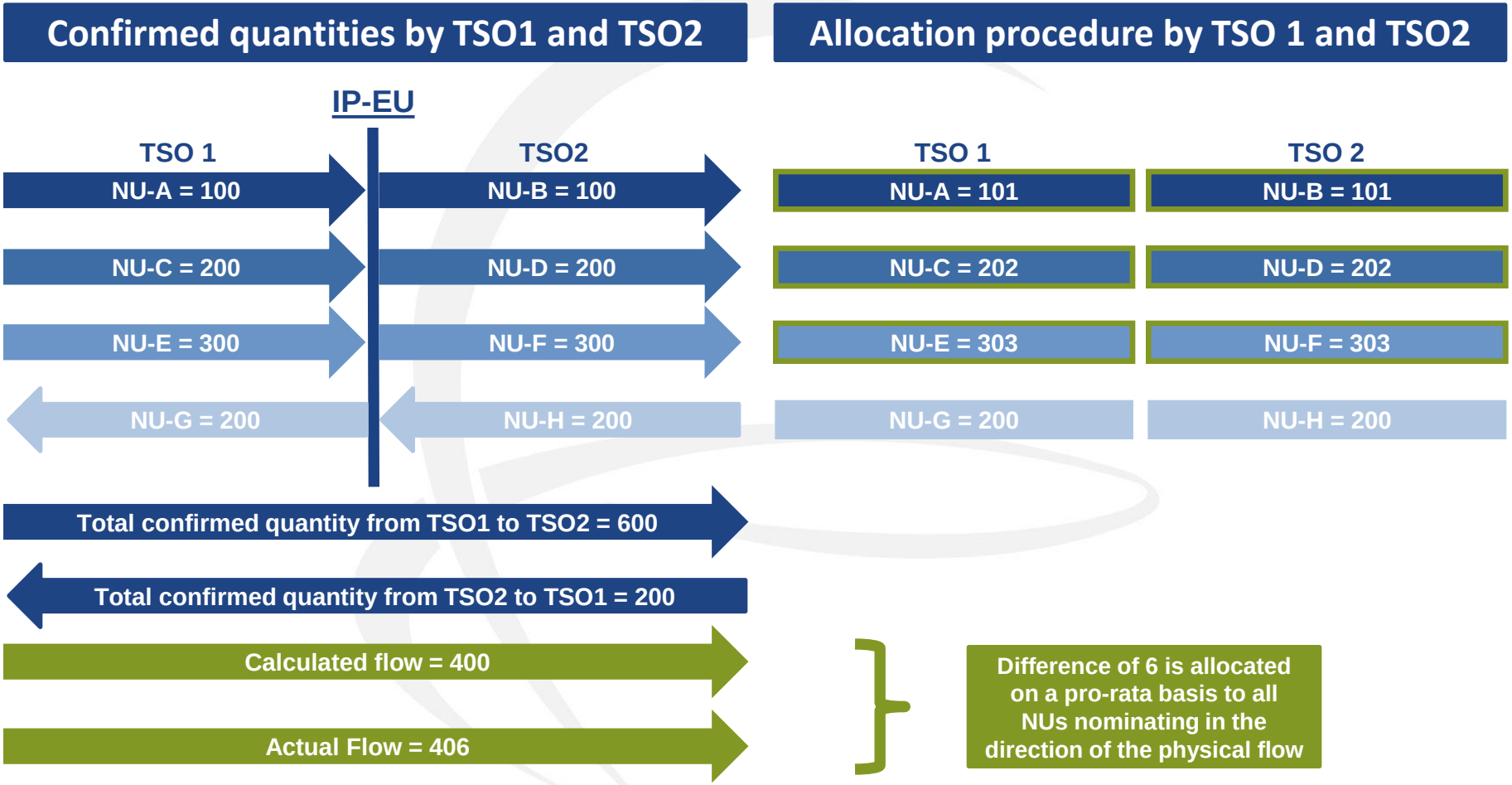


Allocation Rule “OBA” Case 1



Simple example: Only nominations in the direction of the resulting physical flow. The difference between actual flow of 606 and calculated flow of 600 is allocated to the OBA.
The allocation for all NUs is equal to their confirmed quantities.

Allocation Rule “Pro-Rata” Case 2



The allocation for the NUs nominating in the opposite direction of the physical flow is equal to their confirmed quantities.

Interconnection Agreements

Stakeholder's Joint Working Session 1

DISCUSSION PANEL

Brussels, 14 Nov 2012


Network Code Interoperability
and Data Exchange Rules
Kick-off Workshop
26 September 2012 at ENTSO-E conference area in Brussels

Lunch

Gas Quality and Odourisation

Stakeholder's Joint Working Session 1

Brussels, 14 Nov 2012

AGENDA

TSOs RELATED ISSUES:

1. Handling of gas quality differences

2. Odourisation practices

TRANSPARENCY:

1. Short Term Monitoring

2. Long Term Monitoring

Handling Gas Quality Differences

Stakeholder's Joint Working Session 1

Laurent Remy, Fluxys

Brussels, 14 Nov 2012

Handling of gas quality differences

- Different natural gas quality specifications across Europe, based on:
  - Different sources (Russia, Norway, etc.)
  - Historical Long Term Take or Pay contracts
  - Member States legislation (mainly related to the safe use of appliances)
  - Differences in odourisation practices
  - Historical reasons (e.g. Agreements made by vertically integrated companies)
- Networks are better interconnected than in the past with more reverse flow capabilities

Handling of gas quality differences

- Declining indigenous gas production brings about:
  - Increase of new sources with different gas qualities – diversification:
    - More LNG
    - Non-conventional gases
  - Issue of Security of Supply (broad band) vs. lowering emissions (narrow band)

- CEN is drafting a European standard for natural gas (TC 234 WG 11) and biomethane (PC408), but it is a Member State decision to implement or not, so it may not be universally adopted at this stage

GAS QUALITY DIFFERENCES MAY CREATE AN OBSTACLE TO CROSS-BORDER TRADES & GAS MARKET INTEGRATION

Examples

- Wobbe band in UK narrower than on the Continent
- Transmission of odourised gas
- Sulphur content under discussion at EU level
- Non conventional gases injection

ENTSOG initial thoughts

THE FG REQUIRES TSOs TO PLAY A ROLE:

- Gas quality situation should be reviewed on a regular basis by TSOs to avoid a situation whereby gas is prevented from flowing at an Interconnection Point because of a difference in the range of the parameters

- NRAs should have a role to agree (or not) with TSOs whether, something needs to be done‘

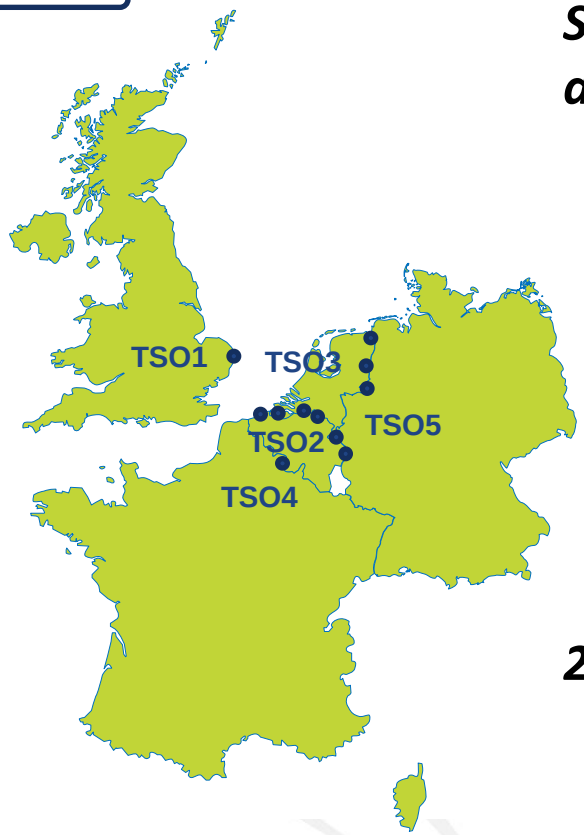
- Gas quality issues can be handled through either commercial or technical solutions

- Potential solutions should be assessed through a CBA, cost recovery mechanisms should be analysed, and the solution submitted for consultation to stakeholders

- NRAs required to approve final solution

Handling of gas quality differences

1. ANALYSIS



1. At IPs between different Member States TSOs have to analyze if there are differences in (national) GQ specifications

no

End

yes

is there (potential) physical flow curtailment?

2. Procedure only applies to IPs where gas is physically flowing

ADJACENT TSOs ANALYZE EACH IP

Handling of gas quality differences

If there is (potential) constraint at IP, TSOs should:

> Agree themselves and with NRAs if solution is needed

2. AGREE IF SOLUTION NEEDED

> Analyze nature of the problem (which parameter)

> Analyze potential solutions on case by case basis:
- **Commercial measures** (flow commitments)
- **Natural Gas Adjustment** (blending, co-mingling)
- **Gas Treatment** (injection or extraction of certain compounds)
- **Other potential solution** (swapping, replacement or adjustement of appliances)

> Analyze technical feasibility

> Analyze costs of potential solutions (CAPEX & OPEX)

Handling of gas quality differences

If TSOs & NRAs jointly agree that solution is needed, then:

> Cost Benefit Analysis of potential options

3. CBA

> Develop potential cost recovery mechanisms

> Submit for consultation to all relevant stakeholders

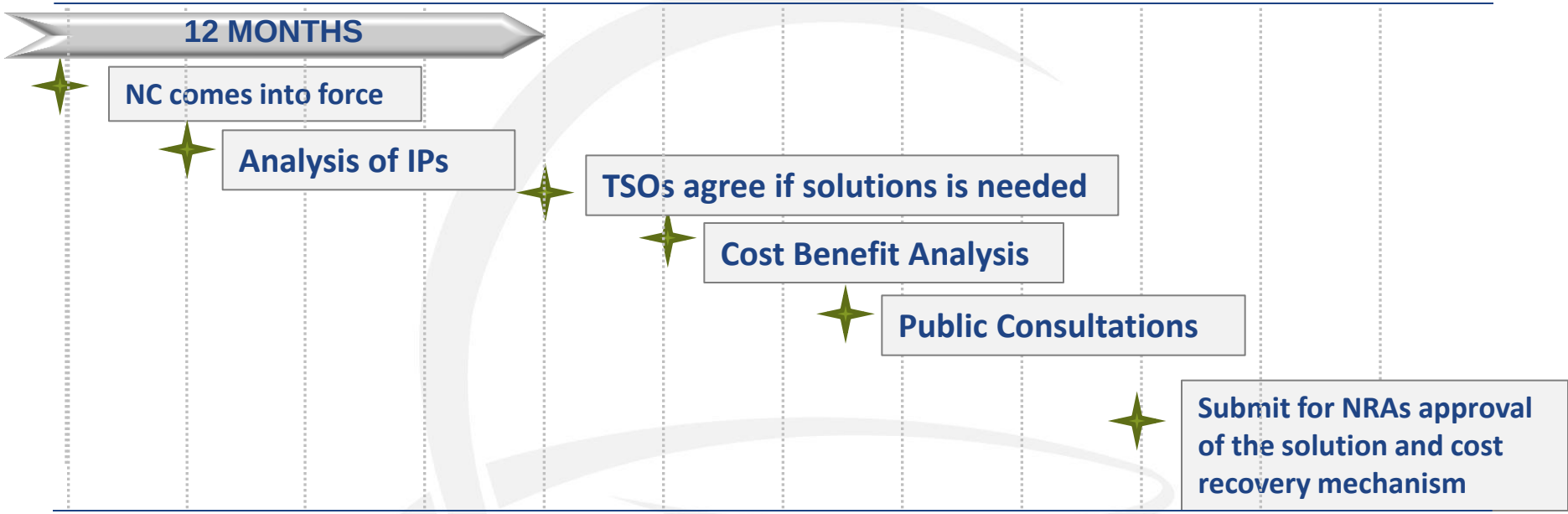
4. Consultation

> Submit proposal for NRAs approval

5. NRAs approval

CBA → Public Consultation → NRAs approval

Handling of gas quality differences



REVIEWING

TSOs should review the situation at IPs every subsequent year:

> Did remaining differences actually prevent gas flows?
> Are new differences likely to interfere?
> If solution is already in place, consideration of its effectiveness

Questions for Stakeholder Consideration

Do you consider that any differences in national gas quality specifications hamper cross-border trade anywhere within the EU currently?

Do you foresee additional cross border issues related to gas quality in the future?

What role should NRAs have in this process?

What criteria should TSOs use to judge where a solution is necessary in order to resolve a gas quality issue?

Thank You for Your Attention

Laurent Remy, Key Account Manager
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Harmonisation of natural gas quality H in Europe - CEN responsibility on EC Mandates

ENTSOG JSWS 1, 2012-11-14, Brussels

Hiltrud Schülken, Secretary CEN/TC 234

Uwe Klaas, Secretary of CEN/TC 234 /WG 11

EU COM DG ENER Roadmap on gas quality

The way forward to identify the best solution enabling EU Member States to face gas quality challenges in the context of interoperability:

- Continuation of European standardisation (M/400 + M 475)
- parallel pilot process aimed at assessing and addressing the practical implementation of the H-Gas standard in a selected group of Member States (Marcogaz/EASEE-gas)
- Development of binding European rules (in the context of a network code) (responsibilities, real-time information…..)

EU COM DG ENER
Two EC Mandates on gas qualities to CEN

- M/400 “Gas quality” (issued in 2007)
- M 475 “Biomethane for the use in transport and injection in natural gas pipelines” (issued in 2010)

➢ **Consequently, no quality requirements required in ACER Framework Guideline and/or defined in ENTSOG Network Code.**

➢ After publication consideration of the ENs in Network Codes.

EC M/400 – Gas Quality – Type H

…split into 2 Phases:

- **Phase I** (CEN/BT WG 197), testing of the **combustion behaviour** of natural gas H (evaluation of the impact of gas quality variations on CE marked gas appliances, including testing of domestic appliances)
- **Phase II** (CEN/TC 234), standardisation of **all relevant parameters** for H-Gas, related to the combustion process (ex. Wobbe index, Calorific value…) and not related to the combustion process (ex. total sulphur, mercaptanes…).
  - Consideration of interoperability related intentions of Madrid Forum, EASEE-Gas CBP 2005/01/002 of and EU Interoperability Study (Poiry)

EC M/400 – Gas Quality – Type H

…split into 2 Phases:

- **Phase I** (CEN/BT WG 197) of the **combustion behaviour** of natural gases (evaluation of the impact of gas quality variations on domestic gas appliances, including testing of domestic appliances)

COMPLETED in 12/2011

- **Phase II** (CEN/TC 234), standardization of **all relevant parameters** for H-Gas, related to the combustion process (such as Wobbe index, Calorific value…) and not related to the combustion process (such as total sulphur, mercaptanes…).

STARTED in 09/2011

  - Consideration of CBP, 2005/01/002 of EASEE-Gas and EU Interoperability Study (Poiry)

EC M/400 – Gas Quality – Type H

The European Standard covers gas quality for all H-gases:

- gas in transit,
- national gas transport
- national gas distribution
- end consumer/appliance manufacturers

} in line with Madrid Forum (see conclusion 03/2012)

➢ All stakeholders of these areas are involved via national delegations and TC liaisons with European associations!

M/400 Gas quality
Madrid Forum conclusions, 27/28-03-2012

- (24) The Forum welcomes the Commission's Roadmap on gas quality to give further impetus to the work in this area. The Forum also thanks CEN for its work on Phase I of the standard and ENCOURAGES IT TO CONTINUE ITS PHASE II WORK taking into account possible implementation timelines. In addition to that, the Forum welcomes Marcogaz's and EASEE-gas' initiative to set up a parallel pilot process, with a more limited set of countries having already similar gas quality requirements, which should be launched aiming to identify practical issues for the implementation of the standard. Stakeholders including DSOs, industrial customers and infrastructure operators should be involved and the conclusions of the pilot process should feed into the CEN work.

EC M/475 Biomethane …

The mandate requests European standardisation of quality specifications for:

- biomethane to be used as a fuel for vehicle engines;
- biomethane to be injected in natural gas pipelines transporting either H-gas or L-gas;
- determination of concentration of biomethane in natural gas pipelines.

➢ considering the ongoing work of the pending M/400,

➢ excluding definitions of any parameters or substances that are addressed in M/400,

➢ restricting specifications to necessary requirements.

EC M/475 Biomethane …

- CEN/TC 408 has been installed to work out M/475.
- With view to the interests in the gas and automotive industry compressed and/or liquified natural gas as a fuel for vehicles is integrated in the scope of CEN/TC 408 by CEN/BT Decision.

➢ Thus, biomethane and natural gas as a fuel are dealt with in conjunction;

➢ The co-operation between CEN/TC 234 WG 11 “Gas quality” guarantees coherence and no overlaps.

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CEN/TC 408 Biomethane …. (M/475)

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Addtional information

Pre-requisite I: Mandate M/400

- In 2007 EU COM (DG TREN, today DG ENER) released a mandate for the preparation of an European standard for natural gas H, to be carried out by CEN, the mandate M 400:
- Mandate M 400 (07-01-2007)
  - Phase 1: Examination of the combustion parameters by CEN/BT/WG 197, finalized in December 2011
  - Phase 2: Production of an European standard for natural gas H under respect of the knowledge gathered in phase 1 by CEN/TC 234/WG 11. Target date is mid-2014.
  - Bases used: ISO 13686 and EASEE-Gas-specification 2005-01-002
  - Wobbe range to be “as wide as possible”

- Reminder: a standard including European Standard is a rule of technique without legal binding character unless directly referred to in a legal document.

EU Mandate M/400 – Abstract (1)

- The Commission hereby requests CEN to draw up standards that define the minimum range to be accepted for gas quality parameters for H-gas. The standards shall be defined according to reference conditions as recommended by the technical committee ISO TC 193.
- In the approach to define the standards, a distinction is made between combustion and non-combustion parameters (see Annex 2). For the combustion parameters a testing programme on safety, efficiency and environmental impact is needed in order to define the standards. For the non-combustion parameters such programme is not needed, and the definition of the standards can be based on the work performed by EASEE-gas.
- Therefore the mandate consists of two phases. In the first phase an analysis concerning the combustion parameters is elaborated. …

EU Mandate M/400 – Abstract (2)

- In the second phase combustion and non-combustion parameters are involved, and CEN is invited to draft actual European standard(s) on a European gas quality. The goal is to define standards that are as wide as possible within reasonable costs. This means that the standards enhance the free flow of gas within the internal EU market, in order to promote competition and security of supply minimising the negative effects on efficiency and the environment and allow the maximum number of appliances to be used without compromising safety. To define the optimal standards, the standardisation work shall be based upon the results and conclusions of the first phase as well as the results of the interoperability study that includes a cost-benefit analysis of the European Commission (see Annex 3).

- The Standards that will be defined by CEN shall take into account:

  - The efforts of the Madrid Forum with respect to interoperability of gas qualities;
  - International standardisation activities;
  - The results of the Interoperability study of the European Commission;

- CEN is invited to base the standardisation work on the achievements of the Madrid Forum process and particularly the achievements of the EASEE-gas' CBP (Common Business Practice) 2005-001-01 on Gas Quality Harmonisation.

Pre-requisite II:
EASEEgas Common Business Practice 2005-001/01
"Harmonisation of Gas Qualities"

Parameter	Unit	Min	Max
WI	kWh/m^3	[13.60]	15.81
d	m^3/m^3	0.555	0.700
Total S	mg/m^3	-	30
H_2S + COS (as S)	mg/m^3	-	5
RSH (as S)	mg/m^3	-	6
O_2	mol %	-	0.001*
CO_2	mol %	-	2.5
H_2O DP	°C at 70 bar (a)	-	- 8
HC DP	°C at 1- 70 bar (a)	-	- 2

Pre-requisite III: ISO 13686

INTERNATIONAL STANDARD

ISO 13686

First edition
1998-05-01

Natural gas — Quality designation

Gaz naturel — Désignation de la qualité

Pre-requisite IV: Results of M/400 Phase I

Step	Proposed range MJ/m^3	Limiting factors
0	None	Adjustable appliances to be considered in order to propose any variation of gas quality: Segment 1 *Condensing boilers*, Segment 3 *Forced draught burners* and segment 8 *Boilers EN 483 Room sealed, full premix fanned* are concerned. This could lead to readjusting appliances on their factory setting (adjustment on reference gas G 20). Non domestic appliances situation has to be clarified.
1	46 to 51	Moderate impact observed on *Instantaneous Water Heaters* (Segment 9) and *Open flue radiant gas fire* (Segment 15) **if combined** with pressure variations above 51 MJ/m^3.
2	46 to 52	High impact observed on *Instantaneous Water Heaters* (Segment 9) **if combined** with pressure variations above 52 MJ/m^3.
3	46 to 53	Moderate impact observed on *Low NOx boilers* (segment 4), *grills* (Segment 5), *Instantaneous Water heaters* (Segment 9 "open flue" and 20 "room sealed") with Wobbe variation **alone** above 53 MJ/m^3. Moderate impact observed on *Partial premix boilers* (segment 7), **if combined** with voltage variations above 53 MJ/m^3. Moderate impact observed on *Storage water heaters* (segment 19) **if combined** with pressure variations for Wobbe index above 53 MJ/m^3.
4	46 to 53.5	High impact observed on *Low NOx boilers* (segment 4) with Wobbe variation **alone** above 53.5 MJ/m^3. High impact observed on *Open flue radiant gas fire* (Segment 15) **if combined** with pressure variations above 53.5 MJ/m^3.
5	46 to 54	High impact observed on *Partial premix boilers* (segment 7), with Wobbe variations **alone** above 54 MJ/m3. High impact for *Storage water heaters* (segment 19) **if combined** with pressure variations above 54 MJ/m^3.
6	45.7 to 54.7	Appliances compliant with GAD are certified against the H-range going from 45.7 to 54.7 MJ/m^3. No knowledge available outside this range. For sixteen segments representing ≈100 million appliances no issues have been observed on the whole range. *Condensing boilers* (segment 1), *force draught burners* (segment 3) and *Boilers EN 483 Room sealed, full premix fanned* (Segment 8) are **not presenting issues on this range when adjusted on G 20** (factory settings).

CEN/TC 234/WG 11 “Gas quality” Status of work

- Where are we: Tasks until and for the sixth meeting on 2012-12-04 in Vienna
  - Predraft WI 00234070, prepared on basis of EASEEgas CPD and ISO 13686, accepted as base document for development of European standard on natural gas , WG Secretary to fill in first drafts of the task groups.
  - Updating the table with national specifications for informative annex prepared by Heimlich.
  - Five task groups have started the work and gave some results:
    + Task group “Scope”; a first draft was formed and put into the predraft.
    + Task Group “Methane number & H2”; WG 11 finalised the discussion referring to a min. methane number. Base proposal is 65.
    + Task group “Sulphur” (H_2S, COS, RSH); first discussions have shown a very differentiated picture, including if peak values should be included or just maximum mean values. Proposals from several countries have been collected, differing from 5 to 158 mg/m³ total sulfur content. Odorization to be a separate point of discussion
    + Task group “Dew point” (water and hydrocarbons); discussion not entirely finalized, but first result included in present draft standard.
    + Task group “Carbon dioxide”; first proposal to be reformulated.

CEN/TC 234/WG 11 “Gas quality” Status of work

- Tasks until and for the sixth meeting on 2012-12-04 in Vienna
  - The combustion parameters (and oxygen); Marcogaz and EASEEgas have started a pilot study to find solutions for the results for M400 phase 1.
  - First meeting of pilot study group was on 2012-07-12. Nevertheless, CEN/TC 234/WG 11 shall NOT to wait for final result of study group if this conflicts with M 400 time schedule.
  - New list of parameters developed by CEN/TC 408 for biomethane injection needs to be checked. Some parameters doubted if at all acceptable for grid injection. TC 408 asks WG 11 for a limit for dust and droplets and impurity clause for natural gas & biomethane (discussion is not concluded, but impurity clause is drafted for inclusion into natural gas standard).

CEN/TC 234/WG 11 “Gas quality”
First Draft Scope of WI 00234070

This draft European standard specifies characteristics and requirements for gases entering networks intended for conveyance of gas of group H,

- defined as Wobbe index range between 45,7 MJ/m³ and 54,7 MJ/m³ (?) at reference conditions 15° C, 15° C, 101,325 kPa,

- intended to be applicable on cross border points and eventually also on networks and infrastructure operating on natural gas type H.

Specific requirements for biomethane are not included as these will be given in prEN…. (CEN/TC 408)

NOTE: It is recognised that some specifications, while acceptable in the general case, may lead to technical or operational problems for some stakeholders. Those impacts have been identified in the standard and their mitigation should be agreed upon by the interested parties in agreement with the regulatory agency.

CEN/TC 234 WG 11 "Gas quality"
List of parameters under discussion

Parameter	Unit	X-Border point		Distribution	
		Min	Max	Min	Max
WI (to be fixed later)	MJ/m^3				
d (to be fixed later)	m^3/m^3	0.555	0.700		
Total S (figure under discussion)	mg/m^3	-	30		
H_2S + COS (as S) (figure under discussion)	mg/m^3	-	5		5
RSH (as S) (figure under discussion)	mg/m^3	-	6		6
O_2 (to be fixed later)	mol %	-	0.001*		
CO_2	mol %	-	2.5		(figure under discussion)
H_2O DP (figure under discussion)	°C at 70 bar (a)	-	-8		
HC DP (figure under discussion)	°C at 1- 70 bar (a)	-	-2		

** Limit is <0.001 mol%, daily average. However, cross border point daily average levels up to 0. 01 mol% will be accepted if these are the result of the prudent operation of UGS's, existing in 2006, which use oxygen for desulfurisation purposes. (Based on the full CBP Wobbe range).*

CEN/TC 408 „Biomethane …..“

Some time after M 400 DG ENER released on 2010-11-08 another mandate, M 475. This applies for a standard for biomethane. To cover the work for this mandate, CEN created the Project committee CEN/TC 408.

CEN TC 408 mandate M 475

Mandate to CEN to produce standards for biomethane

- for use in the transport sector and
- for injection into natural gas pipelines
  - In close cooperation with CEN/TC 234/WG 11 (M 400)

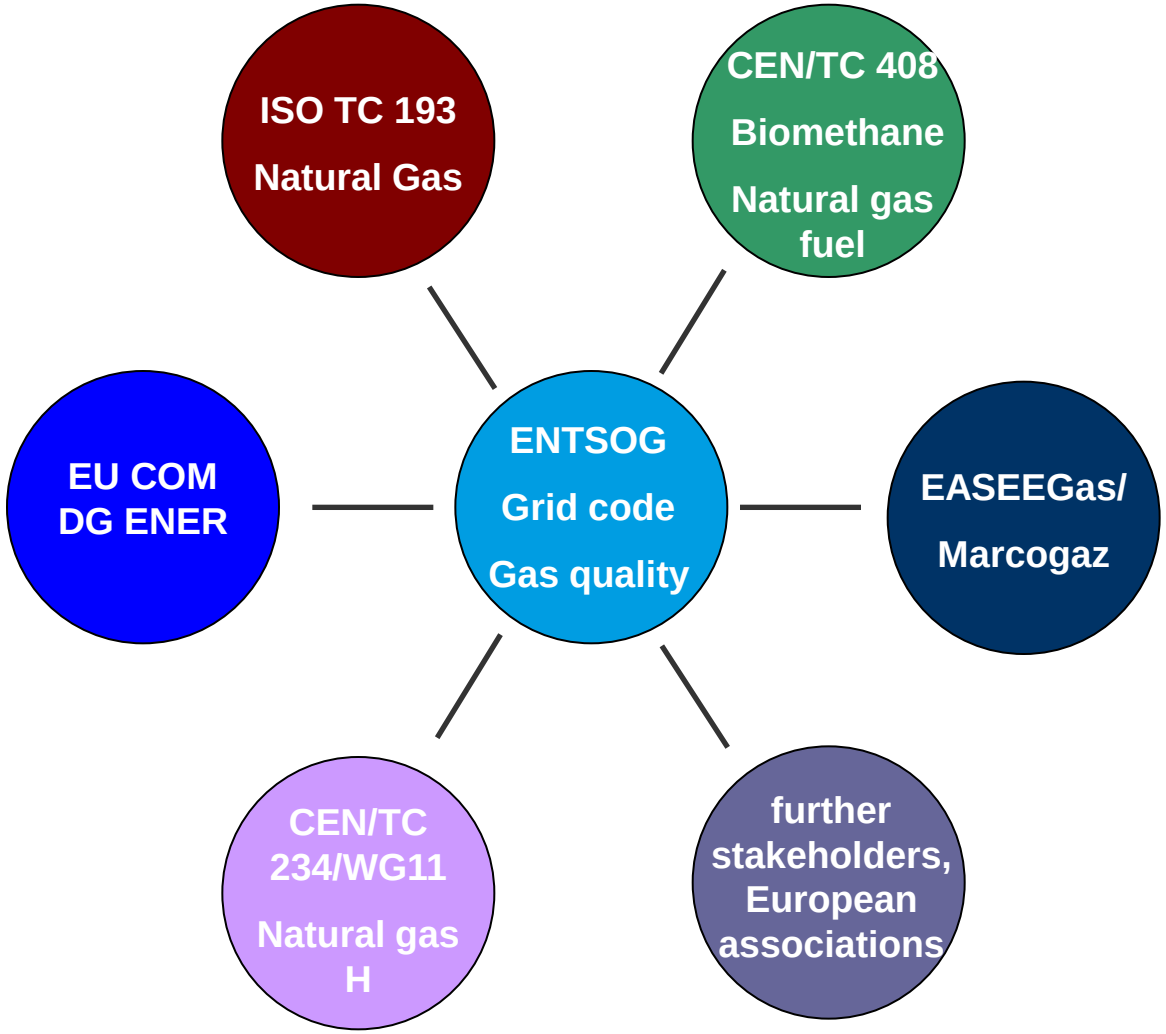
Recently, the scope of CEN/TC 408 was extended to develop an European standard for natural gas as a vehicle fuel.

CEN TC 408 „Biomethane“ – Proposed parameters and values

	Fuel	Grid injection
Dust, droplets (mg/kg)	1 – 10 (?)	*)
Total sulfur (mg/kg)	10	*)
H_2S + COS (mg/kg)	3,5 (new)	*)
Water content(mg/kg)	40	*)
Total silicium (mg/kg)	0,5 (new)	5 (?)
Chlorine (mg/kg)	0,2	0,2 (?)
Oxygen(% v,v)	1	*)
Hydrogen (%, v,v)	2	*)
Aromatic HC, Benzene	-	?
NH_3, Hg, As, HCl, HCN, CO, tar	-	?
Liability clause	*)	*)
Methane number	**85**	***)**

***) to be dealt with by CEN/TC 234, WG 11**

Natural Gas Quality in Europe: Who is involved?



AGENDA

TSOs RELATED ISSUES:

1. Handling of gas quality differences

2. Odourisation practices

TRANSPARENCY:

1. Short Term Monitoring

2. Long Term Monitoring

Odourisation

Stakeholder's Joint Working Session 1

Monika Kaldonek, ENTSOG

Brussels, 14 Nov 2012

Odourisation

Current situation

> Different odourisation practices:
- at DSO level (Belgium, Germany, UK…)
- partially at TSO level (regional) (Hungary, Austria, Germany…)
- at TSO level (France, Spain, Ireland)

> Some countries odourise gas transmission level due to:
- National regulations
- Economical reasons
- Historical reasons

> Different odourants are used across EU:
- S-free (sulphur- free)
- THT
- Mercaptans
- Mixtures

Odourisation

TSOs shall identify at each IP if physical flows are hampered because of a difference in odourisation practises.

If gas is prevented from flowing from an odourised network into a non-odourised network, then:

> TSOs should reach bilateral agreement – 6 months
> TSOs should submit agreement to NRAs

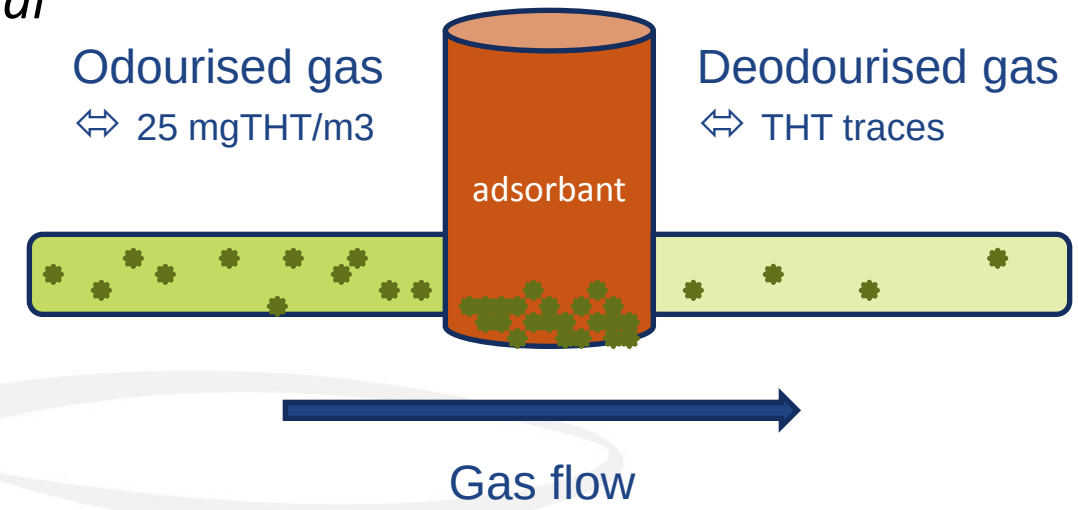
If TSOs fail to reach adequate agreement, then adjacent TSOs should:

> Propose options to remove barrier, i.e.:
  - Deodourisation
  - Change of odourisation practices (national decision)
> Produce cost estimation of each option
> Produce report about implementation timing of solution
> Produce detailed plan, how to reach such solution (12 months)
> Submit to concerned NRAs for approval

Deodourisation

Deodourisation unit

- *removal of odorant from natural gas*
- *no adsorbant completely removes odourant*



⇒ ***Deodourised gas ≠ non odourised gas***

⇒ ***Necessity to find a compromise between costs and efficiency***

Questions for Stakeholder Consideration

What criteria should define the existence of a barrier in the context of odourisation?

What criteria should be used to judge whether or not a bilateral agreement between TSOs effectively addresses odourisation issues?

Thank You for Your Attention

Monika Kaldonek
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marcogaz

TECHNICAL ASSOCIATION
OF THE EUROPEAN NATURAL GAS INDUSTRY








ENSTOG SJWS 1: Interconnection Agreement/Gas Quality/Odorisation November 14, 2012.

MARCOGAZ ODORISATION WG

Marcogaz Odorisation WG

marcogaz

In 2009 Marcogaz set up a working group within its Standing Committee "Infrastructure" with the objective to share knowledge on the possibility to deliver odorised gas, that was excluded from the EASEE-gas CBP "Gas quality".

Marcogaz Odorisation WG

marcogaz

The works lasted from the first meeting on 18th November 2009 to the 10th of September 2012.

Work done:

- Sent a Questionnaire on Impact of transmitting odorised gas and collected the answers.
- Upgraded and revised the Marcogaz odorization table.
- Drafted a document on Odorisation and interoperability.

marcogaz

The *Questionnaire* was utilized to collect available information from the Marcogaz countries in matter of compatibility of different odorants and different odorisation pratices, impact of odorised gas to systems receiving, at the moment, not odorised gas, etc.

marcogaz

The *Odorisation Table*, produced by Marcogaz, reporting the different odorisation practices and requirements, was upgraded and modified, to cover, as far as possible, the new item on interoperability.

6 Countries (CH, ES, FR, IT, PT, UK) answered “YES” to the question “Can odorized gas be received from outside the Country?” and 10 “NO”.

marcogaz

Type of industry receiving not odorised gas in countries where transmission is not odorised :

- **Glass;**
- **Ceramics;**
- **Chemical;**
- **Power plants;**
- **Other technological customers.**

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Up to now, odorised gas is stored in salt cavern in 3 countries, in one country inside aquiferous UGS and for 3 countries in depleted field.

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The *Document on Interoperability* was matter of great discussion; it was not possible to reach a common view. So it was decided to present the information, without a final recommendation.

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Relevant items for Gas Operators, are:

- Modifications in the odorisation process (centralized/decentralized; adaptation of local odorisation station, taking into account the odorant type and concentration coming with the gas).

- Compatibility between different odorants and odorant mixtures in term of smell, control, etc.;

- Necessity to lower the odorant content for customers/operators not used to receive odorised gas.

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Data on Sulphur from odorants (total and mercaptanic) and SO_2 emission estimate are reported in the Document Annexes.

Not considering the Sulphur free odorant, the values of total Sulphur from odorants in the natural gas is less than 15 mg/m^3 (n), with typical values of less than 10 mg/m^3 (n), while the mercaptan Sulphur is less than 4 mg/m^3 (n), with typical values less than 2-3 mg/m^3 (n).

It must be noted that some Companies, not used to handle odorised gas, are worried about receiving odorised gas, not depending on the Sulphur content.

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Conclusions:

The report and the associated document represent the state of the odorisation process in the Marcogaz countries and present the amount of Sulphur which is added to natural gas during this process.

marcogaz

Conclusions:

It shall be noted that some countries strongly adverse the possibility to receive odorised gas from abroad, even if the added amount of Sulphur is comparable to the concentration admitted for natural Sulphur.

marcogaz

Conclusions:

On the other hand, some countries receive amounts of odorized gas, with, until now, no evidence of problem even if different odorant may be used in the neighboring countries.

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The odorisation table and the document on interoperability will be free available on the Marcogaz web site.

Odourisation – view of DSOs

Brussels, 14 November 2012

Presentation by Thomas Deuschle

CEDEC
European Federation of Local Energy Companies

eurogas
THE EUROPEAN UNION OF THE NATURAL GAS INDUSTRY

Odourisation - view of DSOs

situation today

- different practices in EU
  - local differences in the Member states, internal markets and market roles

harmonisation of odourisation practice

- no need for harmonisation of practices, just harmonisation of results

necessary to consider

- pushing odourisarion from TSO entry points to TSO exit points,
  - requires need for hundreds of new odourisation points,
  - changing reasonability's and liabilities,
  - business practices (what is no odourisation? who to inform? etc.)
  - what is on summer nights (low flow and little dispersion of odourant)?
  - what if reverse flow appears and mixture of different odourants, influence on end-user equipment?

Odourisation - view of DSOs

necessary to consider

- pushing odourisarion from TSO entry points to TSO exit points
  - technical rules and legal requirements need to consider → characteristics
    - inflammable,
    - poisonous,
    - hazardous to water

  - ambitious transportation + storing, e.g.
    - maximum volume
    - transport containers
    - impenetrable surfaces

Gas Quality and Odourisation

Stakeholder's Joint Working Session 1

DISCUSSION PANEL

Brussels, 14 Nov 2012

AGENDA

TSOs RELATED ISSUES:

1. Handling of gas quality differences

2. Odourisation practices

TRANSPARENCY:

1. Short Term Monitoring

2. Long Term Monitoring

Short Term Monitoring

Stakeholder's Joint Working Session 1

Laurent Remy, Fluxys

Brussels, 14 Nov 2012

Short Term Monitoring: Introduction

> Short Term Monitoring of gas quality is about **information provision**

> Drivers include:
- Transparency agenda
- Growing EU import dependence
- Greater diversification of supply sources
- Potential future CEN standard

} *Potential for greater variation in gas quality*

> The FG aims to oblige TSOs to provide indicative gas quality information to the following parties to allow them to take suitable action:
- Relevant Network Users
- End Users
- Suppliers

> TSOs may need to expand their role and develop real-time gas quality forecasting tools

Customer requirements should inform scope and charges for potential solutions

Potential Customers

> Primarily, directly connected end-users whose operational processes are sensitive to changes in gas quality, e.g:

- **Industrial manufacturers**
- **Chemical industries that use gas as a feedstock**
- **Power generation sector**

> Storage operators and gas distribution companies may also be interested

> In ENTSOG‘s view, Network Users and Suppliers are ‚commercial‘ organisations who are not affected in the same way by within-spec changes in quality

> However, these parties may be relevant if there are member states which have no provision for direct TSO-end user contracting

Code Content – ENTSOG's Initial Thoughts

> **Solution design** is likely to **vary** among member states
  > Eg, ‚transit' vs ‚meshed' networks

>TSOs will need **detailed input from stakeholders** to assess:
- Demand for this type of service
- Service requirements
- How services could best be provided
- Cost recovery arrangements (both initial set up and ongoing operation)

> In ENTSOG's view, it is unlikely to be feasible or appropriate to define the details of this service within the Interoperability Network Code

> Therefore ENTSOG considers that the Code should establish **obligations on TSOs to consult the relevant parties** and work on solution design at a national level

What Information Will TSOs Need?

ENTSOG envisages a need for feedback from potential customers on the following to enable TSOs to develop gas quality information services:

>Which gas quality parameters are relevant to which customers

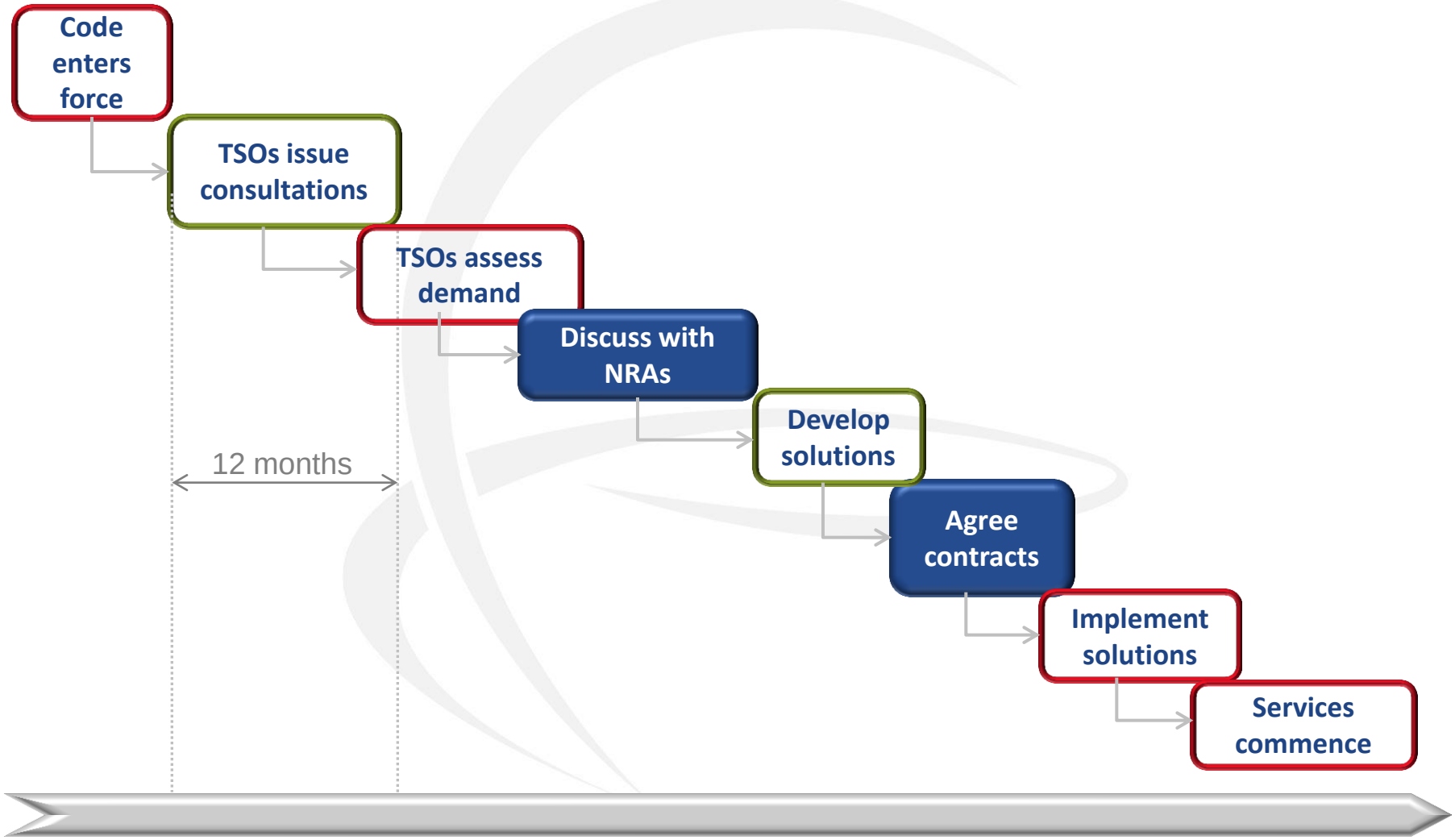
- Eg. Wobbe index, CV, relative density

> Frequency of updates

> Service level

- Quality
- Reliability
- Preferred communication method
- Demand for different service levels at different charges?

Proposed Service Development Process

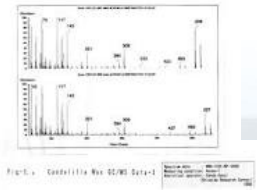


Key Issues

- Liabilities
- Confidentiality of data
- Cost allocation and funding arrangements
  - Targeting vs socialisation
  - Treatment of new entrants
  - Arrangements if costs are not recovered due to lack of interest in services?
- Method of communication








Questions for Stakeholder Consideration

Do you agree that the Network Code should set the high level rules for TSOs to engage with stakeholders and that the detail should be worked out at national level?

What role should Network Users and Suppliers have in gas quality information provision services?

What particular types of end user would benefit from receiving information about gas quality changes in order to take preventive measures?

What are your views on extending the scope to cover SSOs and DSOs?

Do you share ENTSOG's understanding of the services that may need to be developed?

Thank You for Your Attention

Laurent Remy, Key Account Manager
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Draft Network Code on Interoperability and Data exchange Rules

SJWS1

IFIEC-CEFIC position on gas quality

Dirk Jan Meuzelaar

14 November 2012 - Hotel Silken Berlaymont Brussels

IFIEC-CEFIC support the main conclusions of the FG on Interoperability

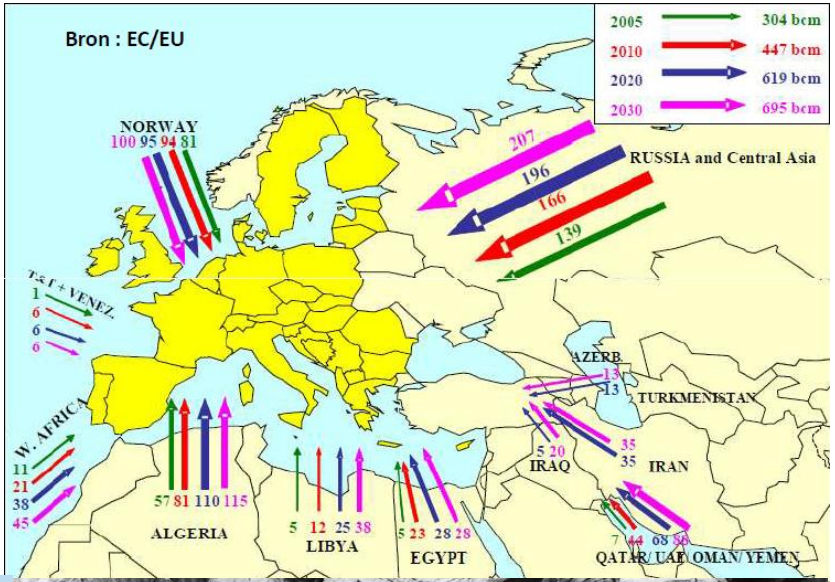
FG Interoperability line

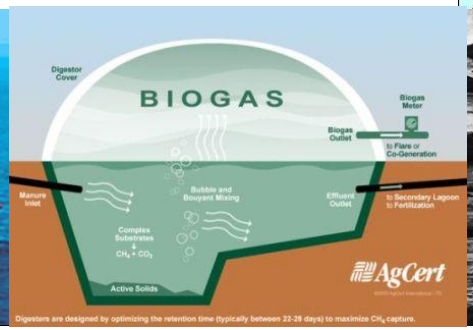
- No wide-spread evidence that gas quality is a trade barrier …
  - Gas quality can be handled by different measures or instruments
  - TSO's set entry specs, co-mingle flows, inject N_2, etc.
- … and to prevent barriers to occur gas quality issues will be delegated to NRAs and TSOs
  - Adjacent TSOs agree where necessary on the handling of gas quality differences at each side of an interconnection point (IP)
  - These TSOs have to cooperate and work out technically feasible and financially reasonable solutions
  - Facilitating cross border trade based on a cost benefit analyses and submit them for approval to the relevant NRAs, following a public consultation with the market.

TSOs and NRAs are responsible for Gas Quality on the grid

Internal market and increasing dependence of foreign or unconventional gas lead to interoperability issues such as changing gas quality

- IFIEC-CEFIC support this development
  - Security of supply
  - More competition supply side
  - Free flow gas trade
    - No discrimination
    - No cross subsidisation
    - No distortion of competition





There should be clear Europan rules to manage the resulting gas quality issues

There is a shared responsibility with regard to gas quality changes and also End Users have to adapt and take their responsibility

Industrial customers are responsible for its

- Safety,
- Efficiency &
- Environmental impact

Responsibility also means control, but … our options are limited

- It is not easy to refuse the gas;
- We can choose our own supplier but not our own gas quality;
- we cannot send the gas back.

Gas Quality must be user led and not producer led

This is in line with Directive 2009/73/EC, underlining that Consumer interests should be at the heart of that Directive

Safety: effects of rapid quality fluctuations lead to reduced liability of operations, having an impact on safety

- Uncontrolled and rapid increase or decrease in reactor temperature
  - Plant trips
  - Unplanned shut down of units
  - Off spec products
- CO-formation & flame instability
- We know examples where variable gas qualities have led to serious damages of equipment
  - Due to deviations of gas qualities some Gas turbines faced high combustion dynamics leading to several failure
  - Easy and simple solutions with existing combustion system not possible
  - In some cases serious damages occured

For hazard we have a zero tolerance policy

Flashback damage to burners has been linked to high levels of higher hydrocarbons
Source: E-ON, David Abbott; EDI Quarterly Volume 4 No 1 April 1012

Efficiency: fluctuations will have a negative impact

- End-users will need more gas for the same output not only for combustion applications …
- … but also for use of gas as a feedstock.

		H : C
Methane	**CH4**	**4**
Ethane	**C2H6**	**3**
Propane	**C3H8**	**2,7**
Butane	**C4H10**	**2,5**

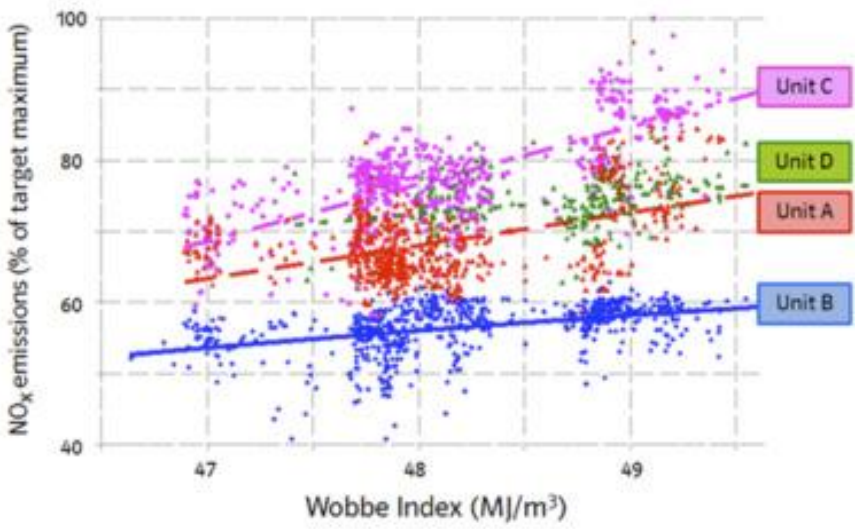
$$CH_4 + H_2O \longrightarrow CO + 3H_2$$

$$3H_2 + N_2 \longrightarrow 2NH_3$$

"Rich" gas makes End Users "poor"

Environmental impact of changes in gas quality

- More oxygen for safety and operational reasons will boost the NOx and CO2 emissions of gas engines, turbines and burners. Tight environmental permits will therefore be difficult to be met.
- Efficiency Dry Low-NOx-burners will decrease.
- Process efficiency will decrease leading to higher CO2 emissions.



Impact of fuel composition on NOx emissions for four similar gas turbines

Source: E-ON, David Abbott; EDI Quarterly Volume 4 No 1 April 1012

"Rich" gas has a negative impact on emissions and endanger site permits

For End Users Gas Quality is **more than** only **Wobbe Index**

Calorific characteristics	unit
Wobbe Index (WI)	MJ/m^3
WI variation	$MJ/m^3/h$
Methane number	
Standard density (ρ)	kg/m^3
Relative density (d)	
Water dew-point	˚C@70 bar
Hydrocarbon dew-point	˚C@ 1-70 bar
Superior calorific value (H_s)	MJ/m^3
Inferior calorific value (H_i)	MJ/m^3
H_i/H_s	
Emission factor	t CO_2/TJ
Maximum CO_2 content	mol %
Minimum combustion air quantity	m^3/MJ

Composition	unit
Total Sulphur	mg/m^3
Inorganic Sulfphur (H_2S/COS)	mg/m^3
Mercaptans (R-SH)	mg/m^3
Oxygen (O_2)	mol %
Carbon Dioxide (CO_2)	mol %
Nitrogen (N_2)	mol %
Hydrogen (H_2)	mol %
Methane (CH_4)	mol %
Ethane (C_2H_6)	mol %
Propane (C_3H_8)	mol %
i-Butane (C_4H_{10})	mol %
n-Butane (C_4H_{10})	mol %
i-Pentane (C_5H_{12})	mol %
n-Pentane (C_5H_{12})	mol %
neo-Pentane (C_5H_{12})	mol %
Hexane+ (C_6+)	mol %
dust/solids	mg/m^3

Proposes Impurity specifications LNG WGC 2009

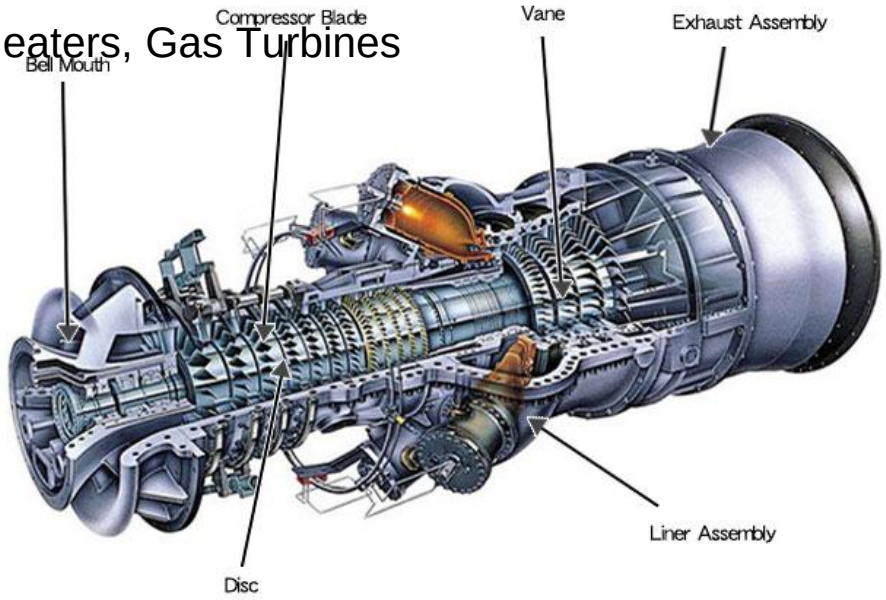
- Hydrogen sulphide < 0.25 grains/100 scf
- Total sulphur < 0.5 grains/100 scf[7]
- Mercaptan sulphur < 0.3 grains/100 scf
- Oxygen < 0.01%
- Nitrogen < 1%
- Carbon dioxide < 0.05%
- Mercury – traces or < 5 nanograms/m3
- Water vapour < 1 ppm

But we cannot provide a uniform set of specification

Gas Quality in MSs and applications end-users are diverse and complex

Industrial consumers use gas application for:

- Heat and power (gas burning)
  - Engines, Boilers, Furnaces, Flares, Heaters, Gas Turbines
    - Wobbe Index and Caloric value
    - Methane Number
    - Composition
- Feedstock (processing)
  - Reactors and Reformers
    - Wobbe index and Caloric value
    - Composition



Beside the bandwidth of the parameters ,we have to focus on the speed of the variations and composition of the gas

Industrial End- Users are only able to take measures to process different gasses according their safety and environmental standards

- Train operators
  - Operator training Simulator show that an operator is able to react safely to a very limited change of the caloric value (by controlling flame speed & air/fuel ratio)
- Install measurement equipment
  - Flow-Monitoring for anticipating on quality changes (gas chromatograph)
  - Combustion Air Requirement Index (CARI), Wobbe Index and Calorimeters
- Investments and process control
  - Install DMC Analyzers (Dynamic Matrix Control)
  - Install Mass Spectrometers
  - Blending installations and pre-reformers
- Adjustment and modify installations

In spite of these efforts, plants and installations are limited for changes in gas quality and its fluctuation. Moreover costs are (sometimes very) high

Most End-Users do not have the knowledge about effects and measures

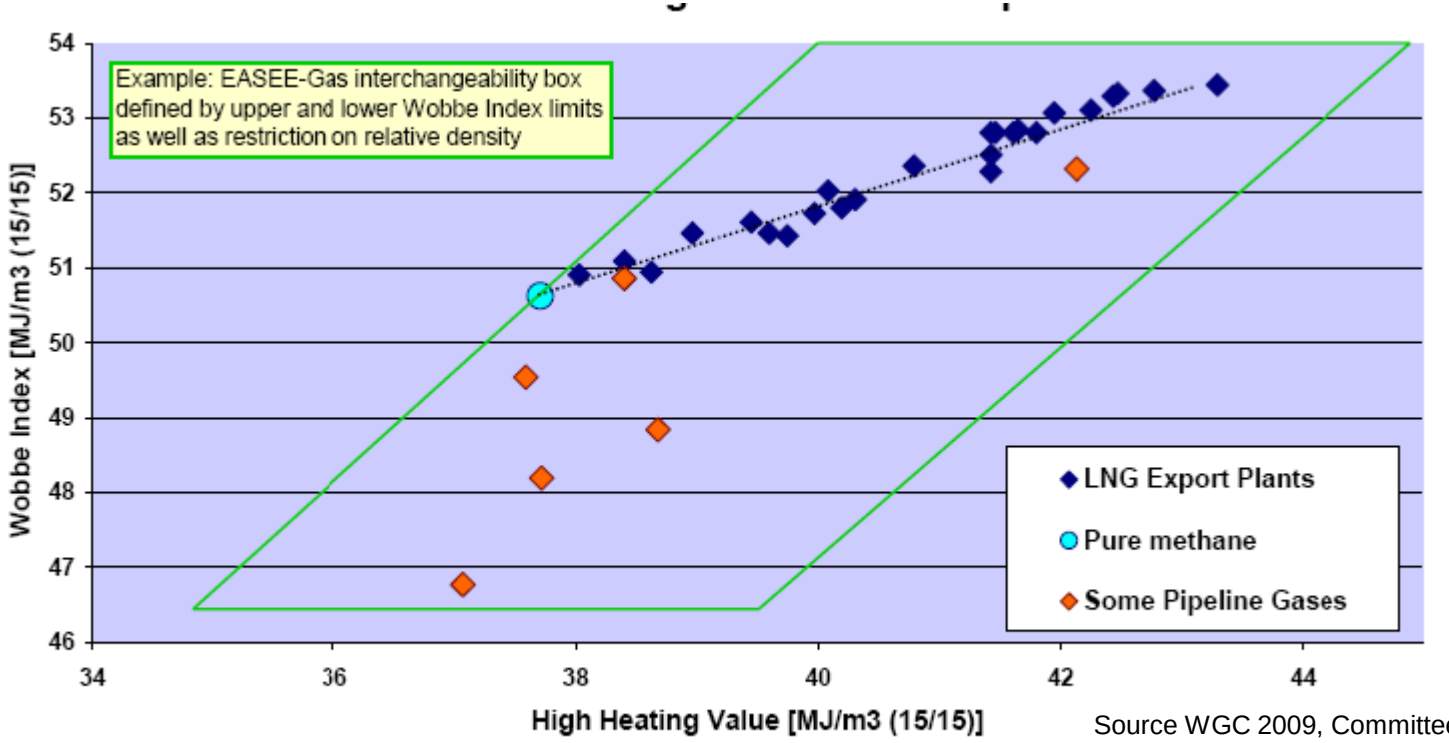
Midstream position of TSOs is crucial for keeping the gas within the gas quality specification range.

- Flow commitments
- Gas treatment
  - Blending and Co-mingling
  - Stripping?
- Swapping
- Monitoring
- Providing (near real time) information

Gas treatment installation Gasunie Ravenstein

Speed control is difficult, but the risks of the speed is revere propositional with the size of the bandwidth of the WI.

Specifications EASEEgas far out of current specification of plant limits

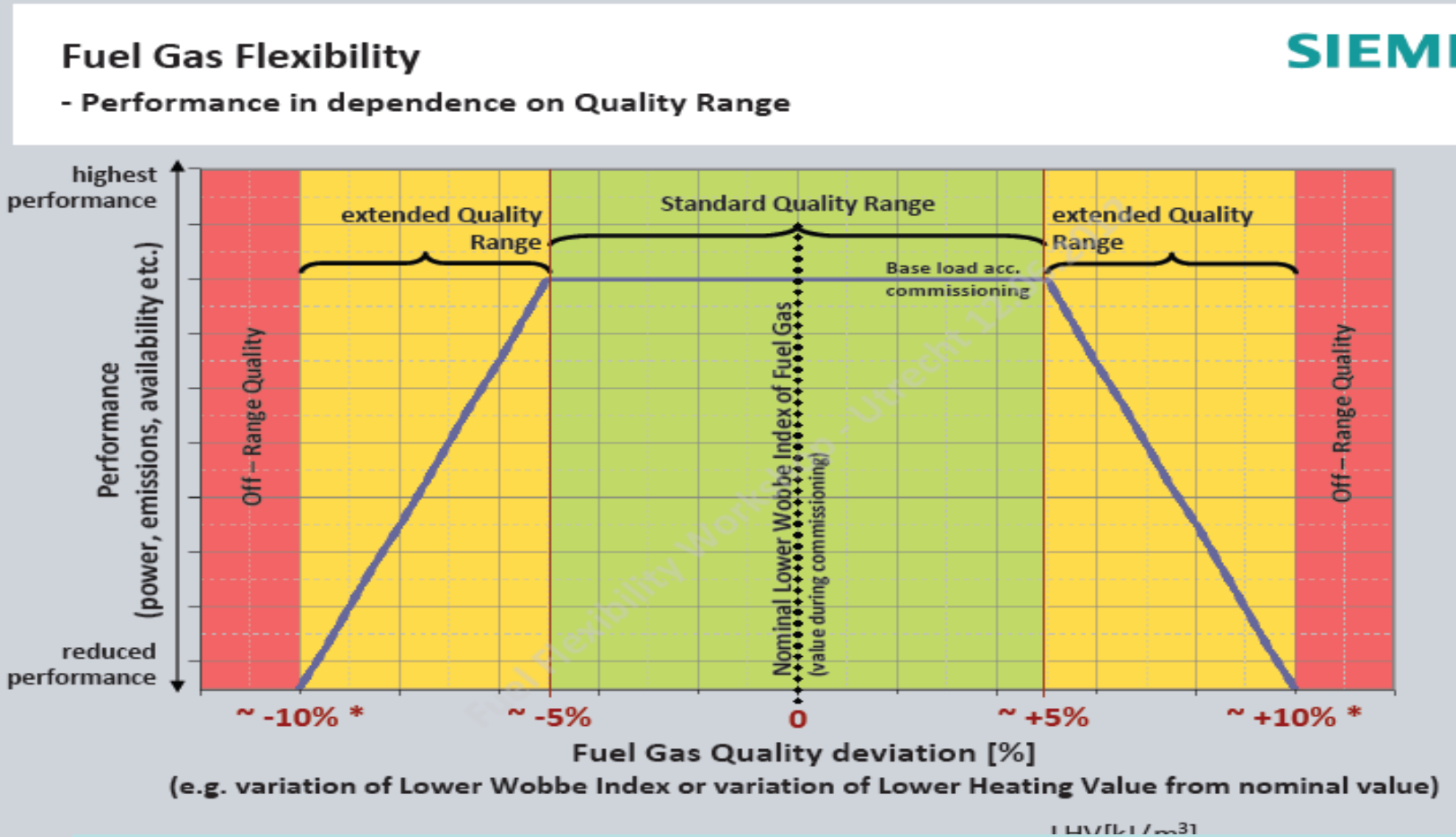


Source WGC 2009, Committee D1

Graph 1: EASEE-gas Interchangeability Box, LNG and pipeline gas qualities[4]

Gas prices are related to caloric value, so suppliers have a incentive in import 'rich' gas

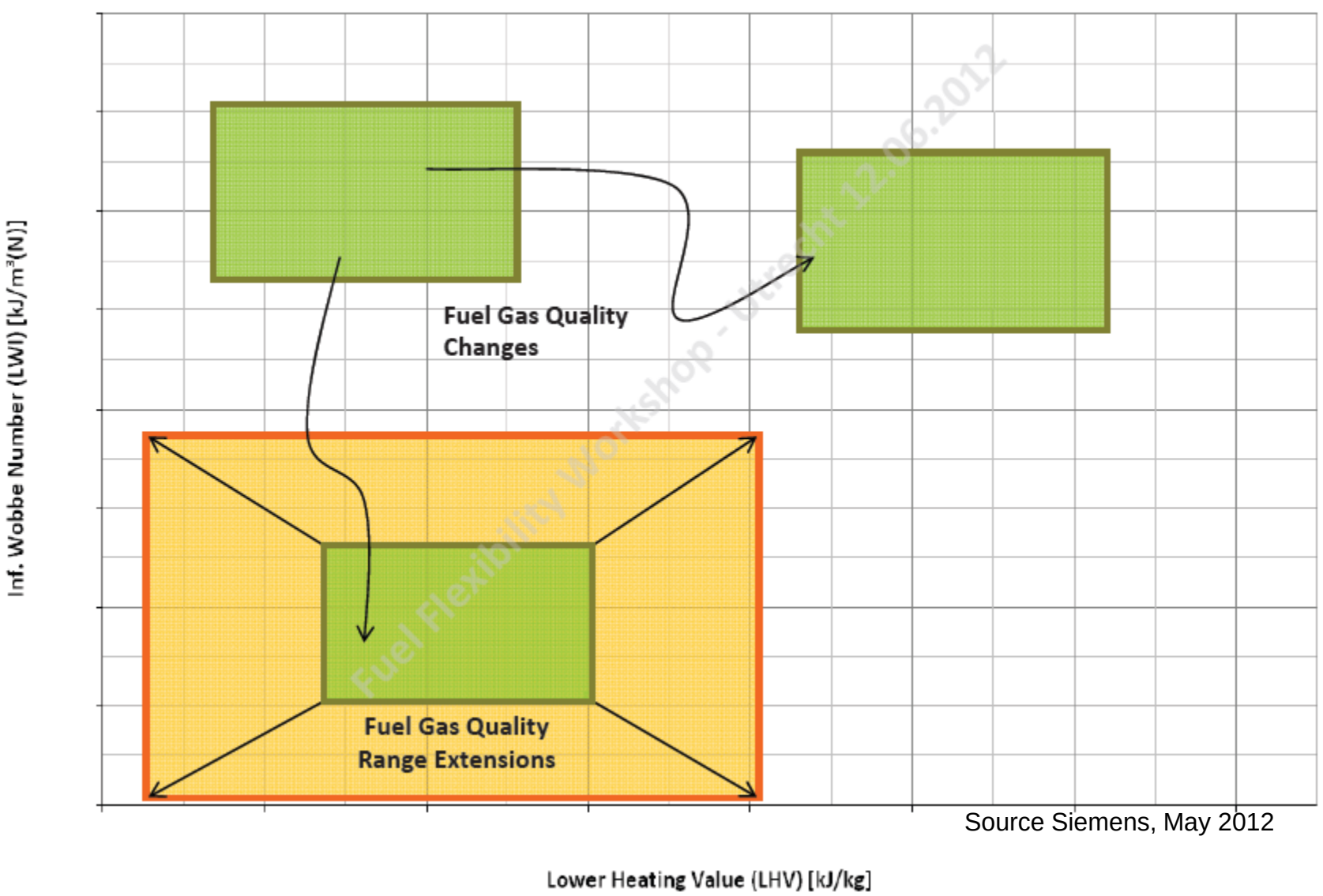
OEMs: working hard to increase range of fuel qualities but no guarantees outside gas specifications for equipment



End-users face high uncertainty and risk; additional scope required

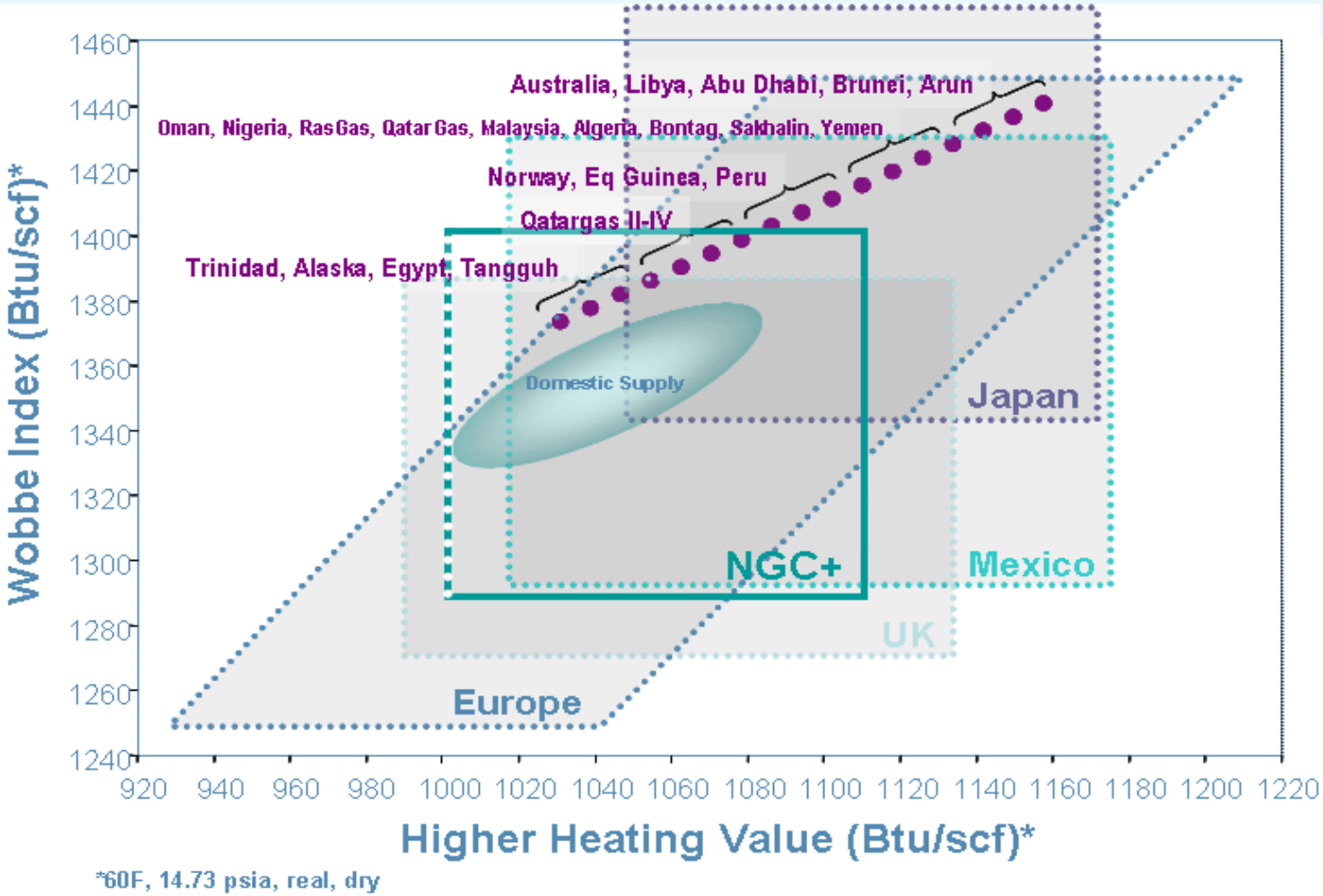
Source Siemens, May 2012

Even in case of the quality range of our equipment increases a limited range of Wobbe Index AND Caloric value is essential



Source Siemens, May 2012

Stakeholder involvement in other countries led to smaller bandwidths



Source: TOTAL and Shell Trading

Source WGC 2009, Committee D1

Level playing field Industrial End-Users in MSs is at stake
Not only in the EU Internal Energy Market but also outside

Authorities Member States and its Regulators decide about legal quality ranges leading to the principle responsible parties

- MSs and NRAs set the legal frame work
- Initiate Cost benefits Analyses
- Rules for dividing the costs
- Have to safeguard internal competition
- Set timeframe for stakeholders to change

We request MSs and NRAs that legal gas quality specifications should be in line within the specification ranges of the End Users

Quote US gas expert Prof. G.F. I Roberts:
“Gas quality should be user led, not supplier led and be careful not to become politician led”

What do we require and should be delivered by the Network Code?

- **Network Code need more guidance**
  - General requirement for NRA's with respect to approval procedures
    - Prevention of deviations gas quality policy of various Member States
    - Equal terms of conditions about gas quality in MSs
  - Clear terms of reference, competence and responsibility of TSOs

- **Harmonization**
  - Only urge for harmonization in case quality difference hinder internal market development or free flow of gas
  - Regional Entry specs (import and production) need in line with Exit specs
    - We support CEN recommendation and the GQ-Pilot

- **Application parameters**
  - Current legislation with focus on WI needs to be extended
    - to improve the operation of the equipment of end-users
    - to prevent gas producers supplying gasses with various undesirable ingredients

- **Monitoring**
  - An adequate system monitoring based on near real time specifications
    - Effective: measuring trigger-parameters in the grid
    - Efficient: measuring at optimum place, interval and trigger-parameter

How to share the burden and the costs

- Main principle: Most efficient (lowest) social cost
  - (Independent) CBA's
  - Causer Pay Principle CPP(no perverse incentives)
  - Harmonization only in case total benefits are higher than total (social) costs
  - Legal specs based on exit (User led)
- Downstream, End Users:
  - Training, measurements and process control
  - Gradual replacement (relating to replacement cycles) instead of 'big bang'
- Midstream (TSOs)
  - No cross subsidizing
  - Socialization in case CPP is unfeasible (system costs etc)
- Upstream (Producers)
  - Entry specs in line with exit specs

Gas quality – view of DSO

Brussels, 14 November 2012

Presentation by Thomas Deuschle

CEDEC
European Federation of Local Energy Companies

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THE EUROPEAN UNION OF THE NATURAL GAS INDUSTRY

Gas Quality

Gas quality is important for DSOs:

- DSO have the task to facilitate the (local) market
- DSO are responsible to inform end users about the impact and effects of gas quality changes
- DSO are responsible for delivering the gas with the right quality to the user, and are liable for it
- Example: Biogas case in 1994 in the Netherlands:
  - Tjongerhof is a farmer who grows flowers in greenhouses
  - in 1994 a nearby biogas injection plant was opened which injected biogas into the grid
  - Greenhouses usually are heated with CHPs and the exhaust gasses are used to fertilize the air to increase the amount of CO2
  - due to the biogas injection the air inside the greenhouse was poisoned with fluor and Tjongerhof could not grow and harvest its flowers, causing him to lose money
  - a court ruling states that the supplier should inform the customer that gas quality is going to change, additional the court rules that the supplier should perform a comparability test meaning that he should test the gas in advance to secure that the gas could be used safely by the user – this requires knowledge of the supplier about the way the gas is used by the user

Gas Quality

the Biogas case proves:

- if gas quality changes:
  - DSO should be part of the gas quality control chain / information chain
  - control / information rules / mechanism have to be established
  - it has to be ensured that the DSO knows changes in quality in advance
  - if an adjustment of appliances is necessary – DSO has to inform the end users in advance

Some remarks to gas quality

ENTSOG SJWS INTER, 14 November 2012

Gas Quality

The deliverables of this NC

- Harmonisation of gas specifications not in scope of this NC, but attractive ness for suppliers, free and safe flow of gas are required
- Focus of NC shall be: how to deal with different national gas qualities at IP's and how to inform sensitive (eligible) customers
- A transparent identification of the issues to be solved needed
  - Gas quality is not a problem at each IP now
  - Things might change depending of sourcing
  - Consequently this NC mainly has to describe processes and some guidance for potential solutions but not the solution itself

Gas quality at IPs

ENTSOG approach of process description reasonable

- As long as there is no European standard the national specifications apply
- At cross-border point national specifications may differ, but this is not always an issue
- TSO's best placed to judge if such difference is a real barrier for gas flow, downstream operations to be safeguarded
- Efficient solutions preferential, trying to minimize the investments
- In this respect odorisation is a special issue because
  - It is linked to national safety and legislation
  - De-odorisation is expensive, Complete de-odorization is not feasible

Gas quality monitoring

Transparency crucial but should deliver guidance

- Transparency on gas quality at cross-border points desirable
- Some sensible customers/eligible customers may need detailed information even if national specifications are met
  - Should be addressed on a case by case basis
  - Based on bilateral technical and financial agreement between TSO and eligible customer
- Long term monitoring and gas quality outlooks by ENTSOG can't deliver real value to market and policy makers
  - Infrastructure operators can report the status quo
  - but they are not in the supply and upstream market

AGENDA

TSOs RELATED ISSUES:

1. Handling of gas quality differences

2. Odourisation practices

TRANSPARENCY:

1. Short Term Monitoring

2. Long Term Monitoring

Long Term Monitoring

Stakeholder's Joint Working Session 1

Olivier Lebois, ENTSOG

Brussels, 14 Nov 2012

Possible content

Identification of possible evolution

- Identification of supply sources likely to induce change in gas quality
- Potential trends in relevant gas quality parameters and in particular Wobbe Index as it is seen as the major potential change (LNG, biogas…)
- Evolution of their variability
- Analysis carried out at regional level for year plus 5 and 10

Challenges to be faced

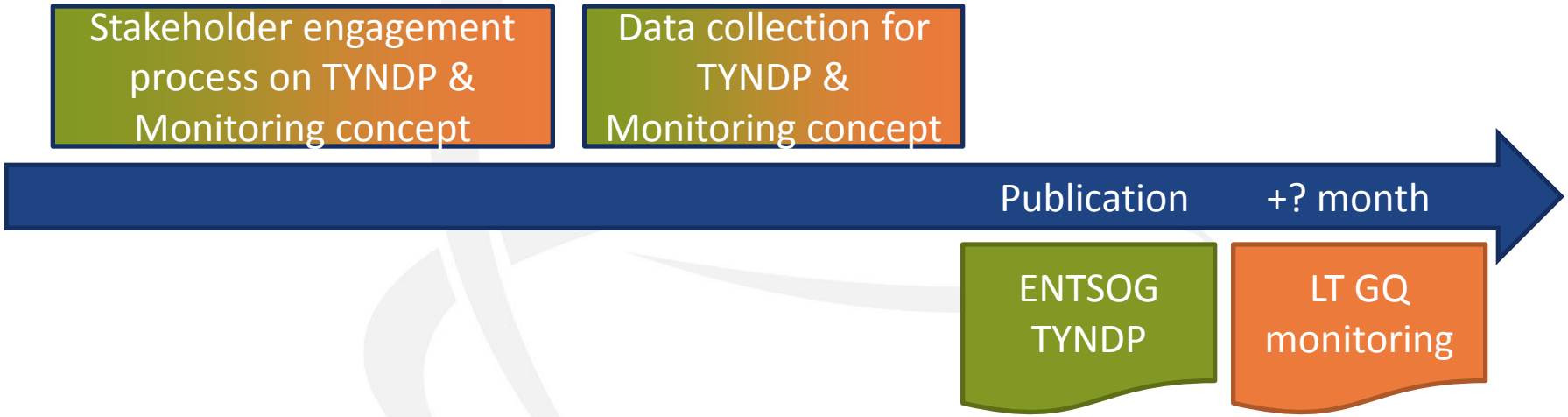
- The role of the outlook is unclear making difficult to define its content
- Access to supply data is already challenging, assuming their future quality parameters will be even more
  - By default, gas quality parameters of sources will derive from historical analysis

Network code process should help to better capture stakeholders' expectation in order to define the most valuable outlook framework

Consistence with ENTSOG TYNDP

Optimized process and aligned publication

- TYNDP stakeholder engagement process will be enlarged to the gas quality topic in particular to have access to the reference values of gas quality parameters
- Slightly later publication will avoid confusion between reports



Consistent results

- Supply and demand scenarios/cases together with resulting flow patterns will derive from TYNDP
- Scenarios and cases will be selected based on their relevance for gas quality topics

Gas Quality and Odourisation

Stakeholder's Joint Working Session 1

DISCUSSION PANEL

Brussels, 14 Nov 2012

entsog
european network
of transmission system operators
for gas

Coffee break

Closing remarks

Concusions

- Very good level of participation, despite difficulties – Thank you all
- Presented material/ participant list and notes to be published within 2 days
- Please send concrete remarks – answers to questions shown\
- Bilateral meetings/discussions are welcomed (i.e. IFIEC)
- Input to be used for refining the pre-reading material and come up with business rules
- Business Rules shall be published before SJWS3 (11 Dec) and discussed during meeting
- Input received today:
  - More transparency in developing/ amending IA's
  - How Bundled products are handled within IA's still to be investigated
  - GQ tailor – made info provision towards NU is important
  - What is the improvement to be brought by the INT NC?

Thank You for Your Attention

ENTSOG -- European Network of Transmission System Operators for Gas
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