



Picture courtesy of Gas Connect Austria

Joint ENTSOG, EASEE-Gas, GIE Data Exchange Workshop

17th October 2023

ENTSOG offices, Brussels

1. Welcome



Hendrik Pollex
Director, System Operations
ENTSOG

ENTSOG

2. Agenda



Host for the wksp - Douglas Walker Hill
Interoperability & Data Exchange Advisor
ENTSOG

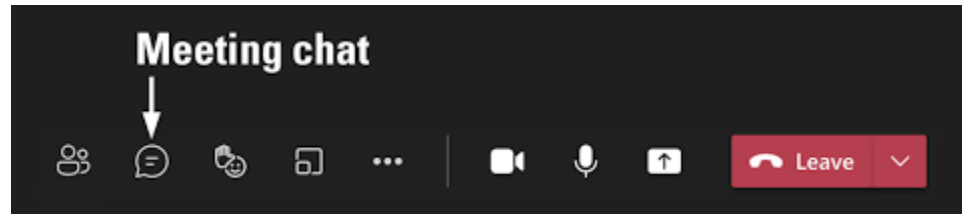
ENTSOG

Data Exchange Session



Speaking slot	DAY 1. 17th October - DATA EXCHANGE - Presentation topics	Presenter and affiliation	Start	Method
1	Introduction and welcome	Hendrik Pollex - ENTSOG	12:30:00	Physical
2	Agenda	Douglas Hill - ENTSOG	12:32:00	Physical
3	Update REMIT reporting and live demo of Transparency dashboard	David Defour - GIE	12:35:00	Dial in
4	EASEE-gas: 6.1 edig@s in application	Oliver Schirok - VNG	13:00:00	Physical
5	EASEE-gas: EASEE-Connect	Wim de Olde - Gasunie	13:15:00	Physical
6	EASEE-gas: Auto certificate update	Dirk Serruys - Fluxys	13:30:00	Physical
	BREAK 13:45 - 14:05	20 min	13:45:00	
7	AS4: eDelivery rationale for AS4 updates	Bogdan Dumitriu - EC eDelivery	14:05:00	Dial in
8	AS4: ENTSOG profile update	Pim vd Eijk - Sonnenglanz	14:20:00	Physical
9	AS4: AS4 from a Service provider perspective	Christoph Malzer - Navitasoft	14:50:00	Physical
	BREAK 15:05 - 15:25	20 min	15:05:00	
10	CNOTS: TSO UA - Sharing experiences in CNOT application.	Andrii Prokofev -TSO of Ukraine	15:25:00	Dial in
11	CNOTS: New gases and Hydrogen - Fit for purpose?	Jarle Ronnevik - Equinor	15:40:00	Dial in
12	CNOTS: Gasunie, CNOTS for hydrogen	Onno Wesselink - Gasunie	15:55:00	Dial in
13	Round up and questions and answers - future of Data Exchange CNOTS	Douglas Hill - ENTSOG	16:10:00	Physical

Questions



- *Online please ask your questions via the Teams chat*
- *Physical attendance please ask questions at the end of the presentation*



3. REMIT Updates



David Defour
CTO
GIE

GIE

Gas Infrastructure Operators

Regulatory reporting, technical setup & coverage

David DEFOUR

GIE CTO / Chief Technology Officer
GIE REMIT RRM-IIP Administrator

REMIT reporting

for gas infrastructure operators



ALSI
Aggregated LNG Storage Inventory



AGSI
Aggregated Gas Storage Inventory



IIP REMIT UMM
Inside Information Platform

REMIT as regulatory basis

17 years of Information to the market on **Security of Supply**

Since 2006

GIE Transparency Platform by SSO/LSO (Voluntary publication)

Since 7 April 2016

GIE as Registered Reporting Mechanism for REMIT

for REMIT Fundamental Data reporting on storage and LNG to ACER



REGULATION (EU) No 1348/2014 on Energy Market Integrity and Transparency

Since 1 Jan 2021

GIE as Inside Information Platform for REMIT

for REMIT Inside Information reporting on transmission, storage and LNG to ACER



REGULATION (EU) No 1227/2011 on Wholesale energy market integrity and transparency

Since June 2022

GIE as central Transparency Platform with pan-European coverage



REGULATION (EU) No 2022/1032 ~90% Filling levels

As of 28 Feb 2023

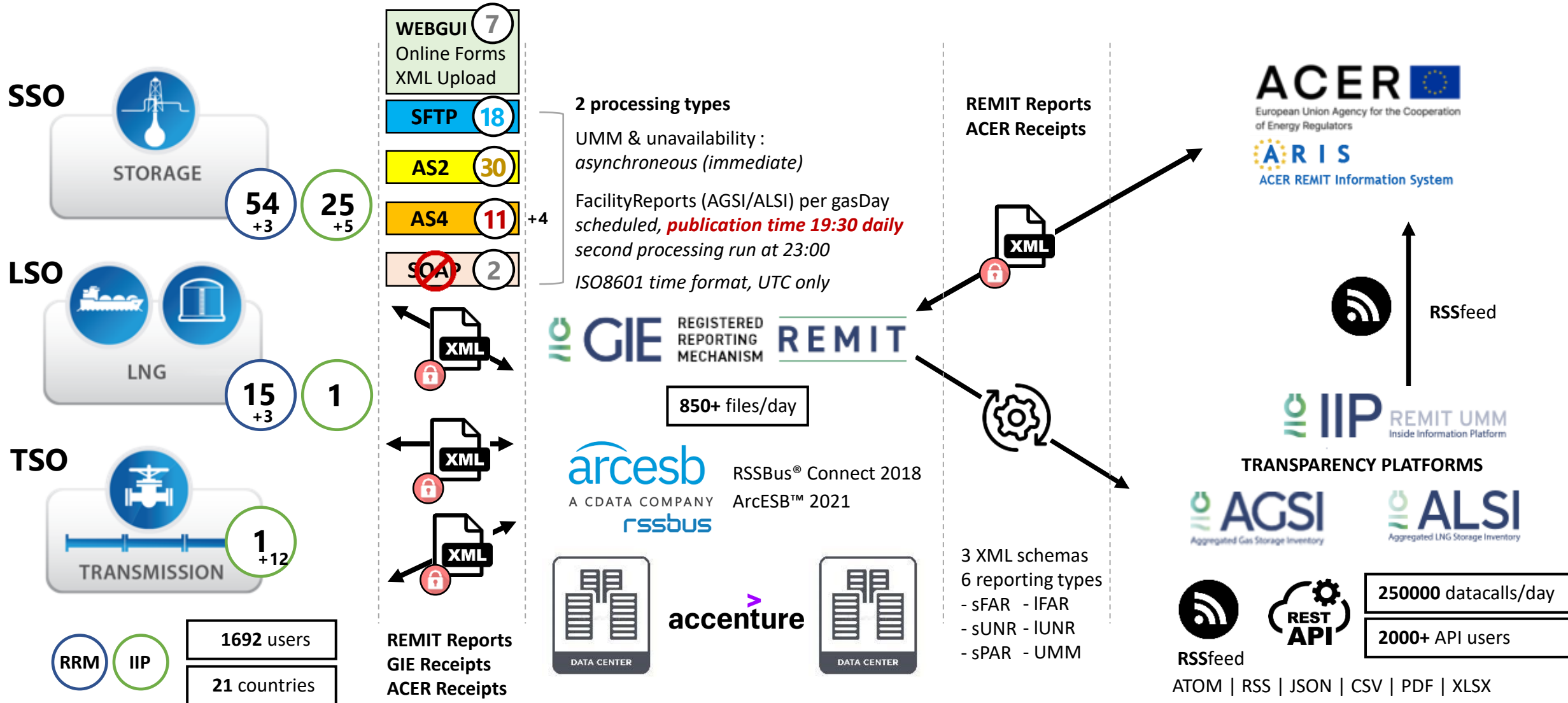
GIE Transparency Platform – regulatory role



REGULATION (EU) No 2022/2576 ~ Enhancing Solidarity

REMIT & Transparency Platforms

Secure data exchange channels



Stability & Security

Upgrades & Status



- **Huge increase in traffic**
- Incompatible / Excessive API data calls
- Additional Data Analyst / Audience inquiries
- Repackaging & Republication of AGSI-ALSI data



API service updates :

bandwidth throttling, pagination, API calls limiting, data monitoring

Website updates:

New layout (ALSI), Data Visualisation tools, Interactive maps, Data Usage guidelines

Processing updates:

Code engine update (processing, timing, caching)

Additional assets & resources (CPU cores, memory, bandwidth, DNS updates)

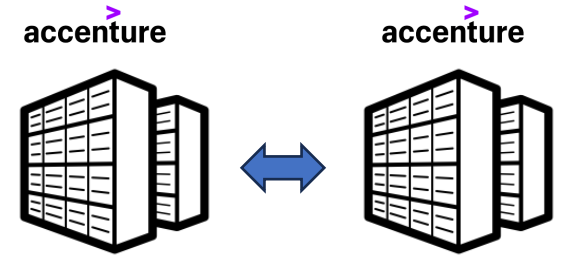
Security / Resilience / Redundancy



Additional assets & resources rolled out



Dual mirrored datacentres in Belgium
for AGSI-ALSI-IIP & REMIT reporting



Reciprocal failover with ENTSOG IIP
GIE IIP takes over ENTSOG IIP & vice versa



As part of a larger security up-scale, GIE implemented a **CloudFlare** solution at its datacentres. A connection via the CloudFlare global distributed network assures fast loading speeds of web infrastructure and adds additional protection and website security, specifically against DDoS and other cyber attacks.



As of 01.01.2024, all REMIT reporting towards ACER is mandatory via a dedicated **VPN connection**

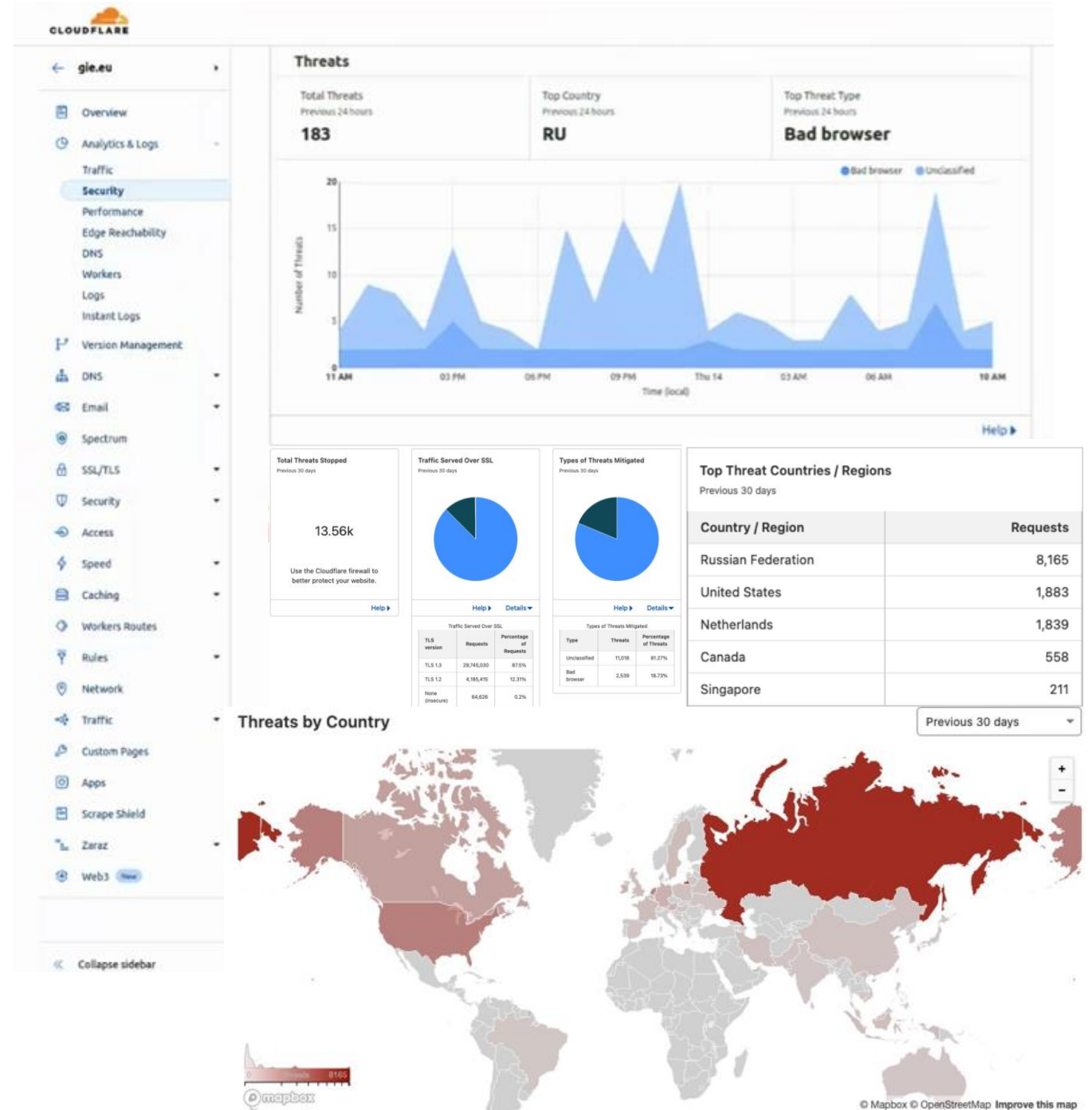
CyberAttacks

GIE Transparency Platforms experienced large spikes in suspicious connection attempts (DDoS). Our dual datacentre was able to cover this – all reporting operations remained available.

An IP block has been activated for some countries, data still remains available but only via **VPN**

Continuous data monitoring is in effect.

In case of malicious / excessive API calls: the credentials can be removed



GIE Transparency Platforms

for gas infrastructure operators



ALSI
Aggregated LNG Storage Inventory



AGSI
Aggregated Gas Storage Inventory



IIP REMIT UMM
Inside Information Platform

ALSI – LNG Transparency Platform

Daily inventory and send-out status by LNG Operators

- Daily data reporting to **ACER**
- Daily data publication on **ALSI**
- Direct data provision by **LSO**

100%
EU 27
coverage


Aggregated LNG Storage Inventory
25 terminals
11 countries

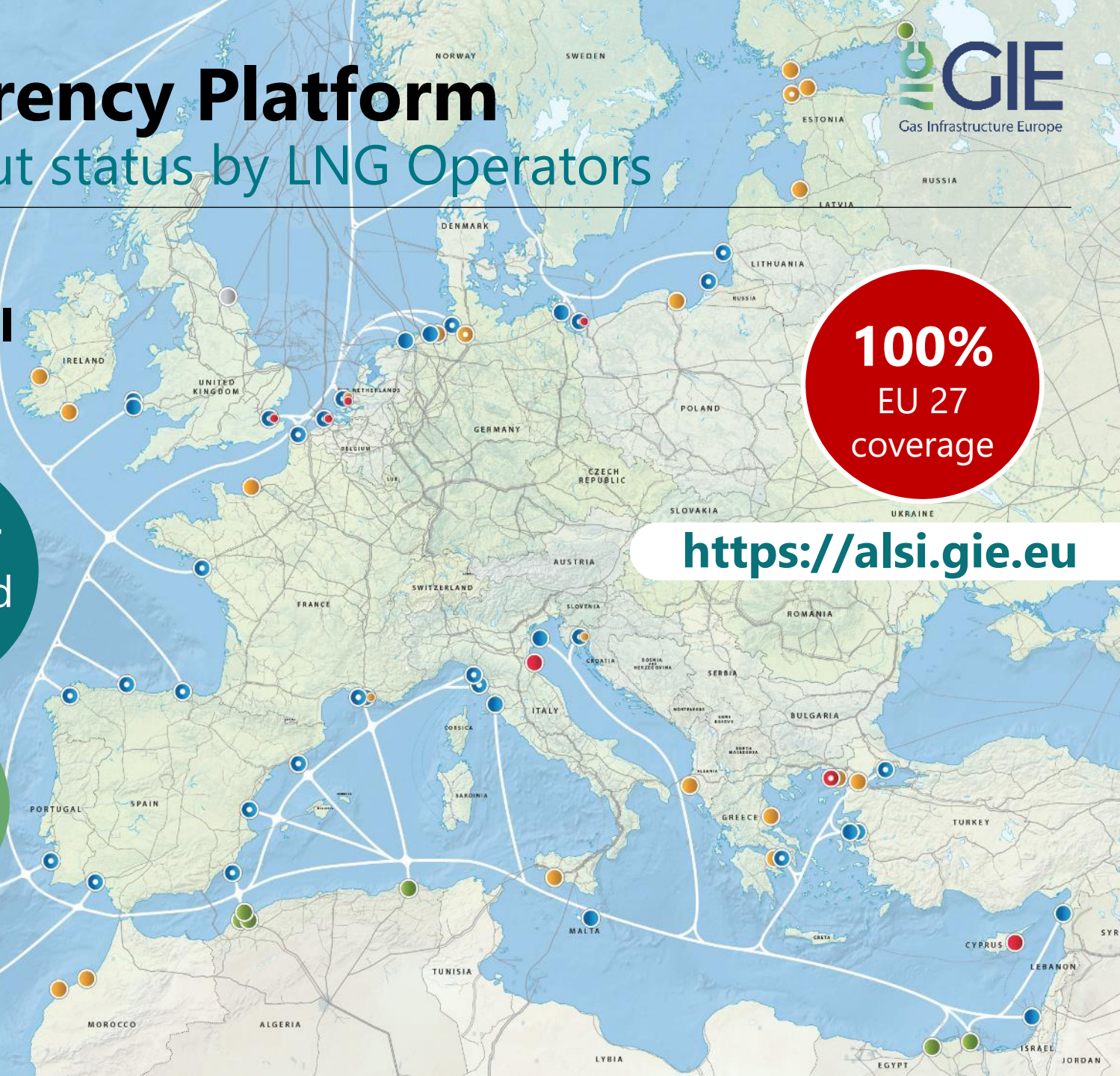
SEND-OUT
6,5 TWh/d

STORAGE
53 TWh

7 new
terminals
in 2023

-  IMPORT / OPERATIONAL
-  IMPORT / PLANNED
-  IMPORT / UNDER CONSTRUCTION
-  EXPORT
-  SUSPENDED
-  SMALL SCALE LNG SERVICES

<https://alsi.gie.eu>



AGSI – Storage Transparency Platform

Daily inventory status by Storage Operators

- Daily data reporting to **ACER**
- Daily data publication on **AGSI**
- Direct data provision by **SSO**

100%
EU 27
coverage

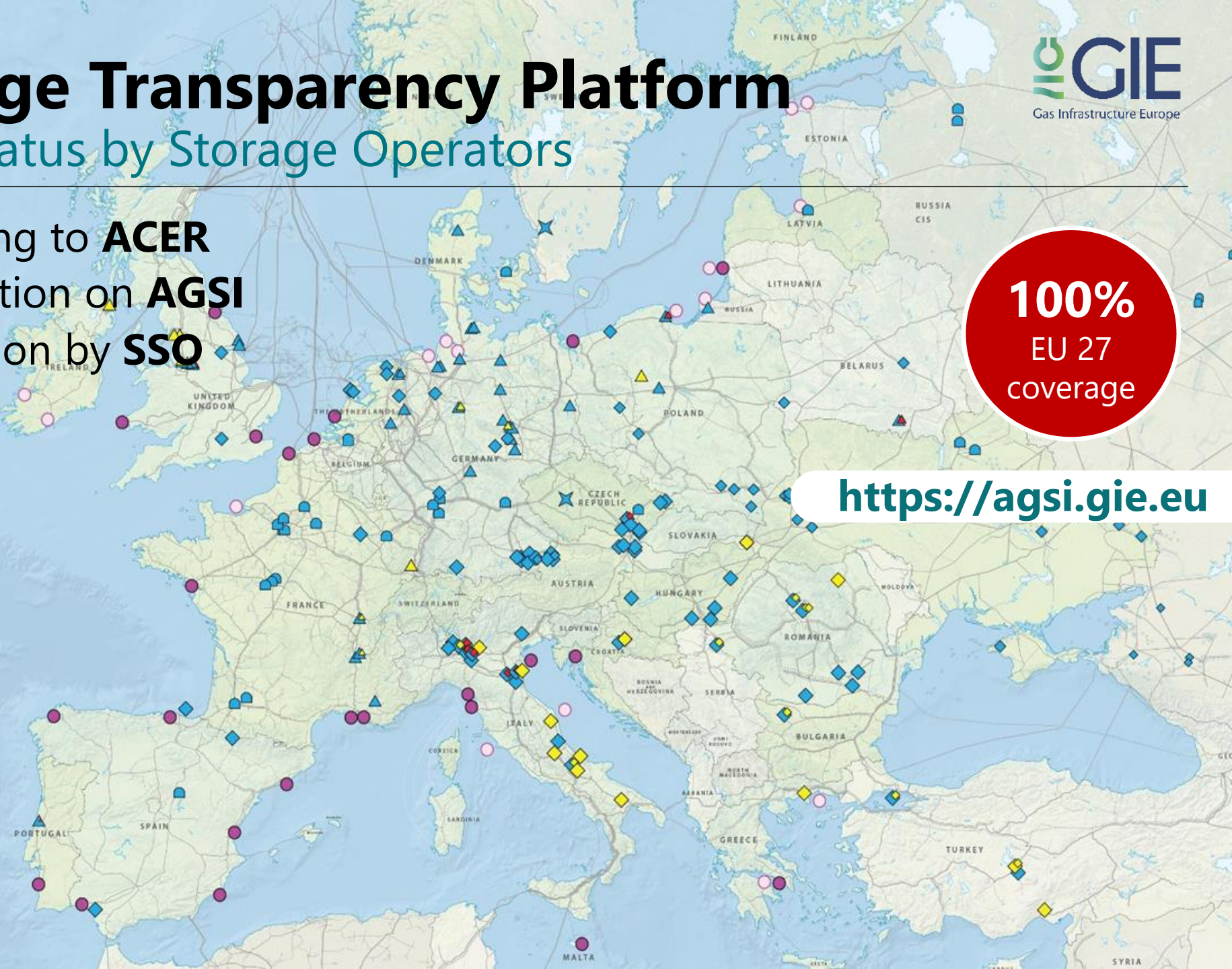
<https://agsi.gie.eu>



AGSI
Aggregated Gas Storage Inventory

164 facilities
20 countries

WGV
1128
TWh



Daily inventory publication by LNG & Storage Operators

based on regulatory REMIT reporting

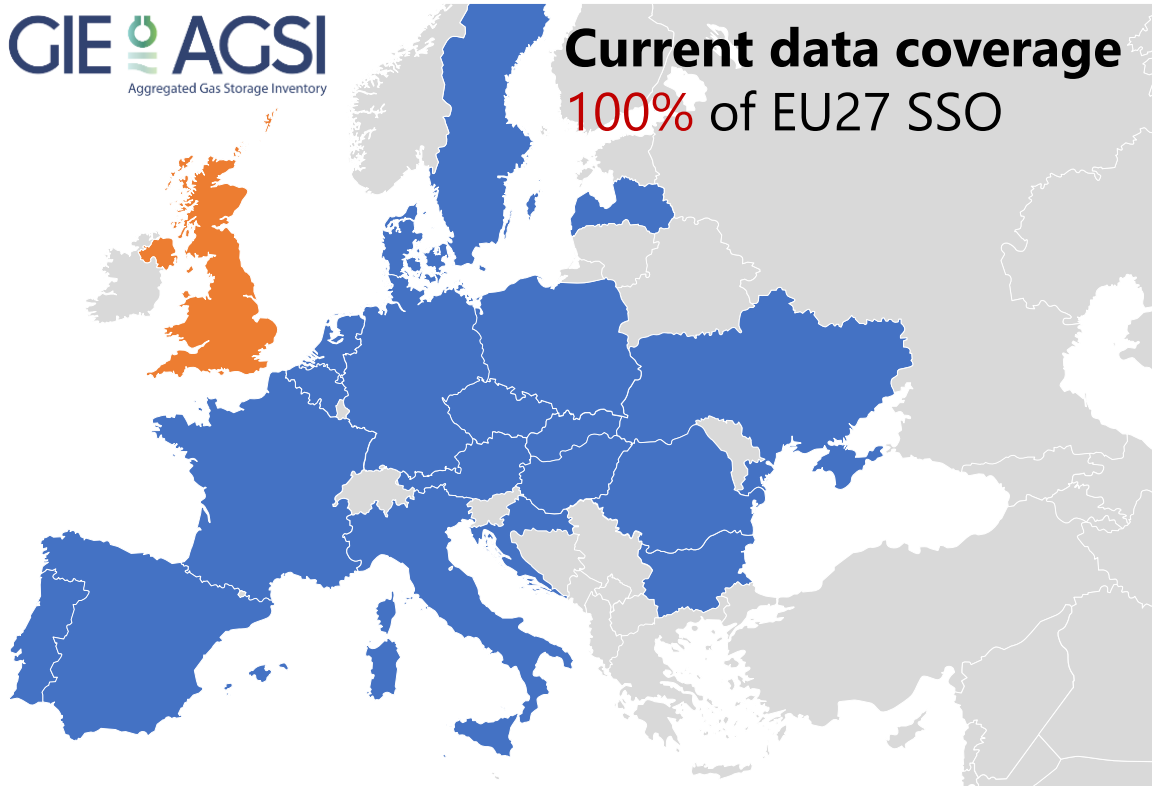
Focus : Security of Supply

- **Geographical coverage:** **100% of EU27 + UK + Ukraine (AGSI)**
- **Granularity :** by facility | company | country | EU & non-EU
- **Historical data:** **10+years** since 2011/2012 – REMIT reporting since 2016
- **Data usage:** free of charge | also available via API service | RSSfeed



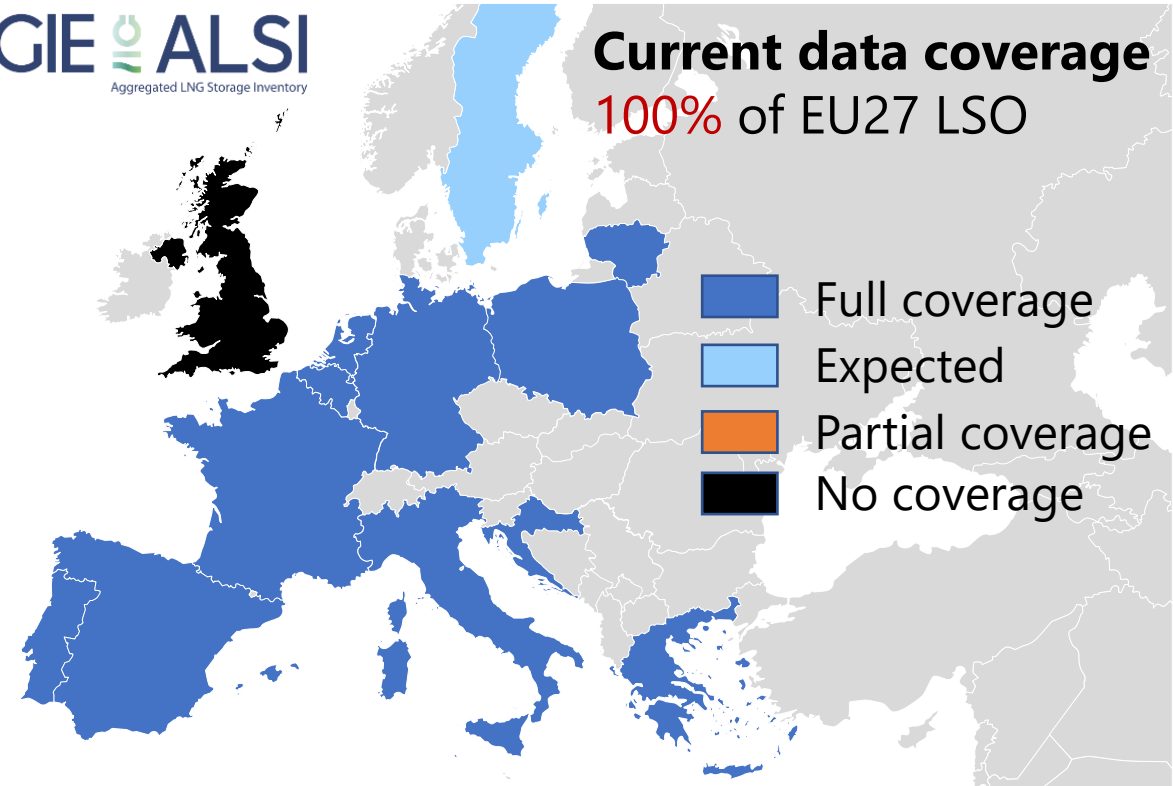
GIE AGSI
Aggregated Gas Storage Inventory

Current data coverage
100% of EU27 SSO

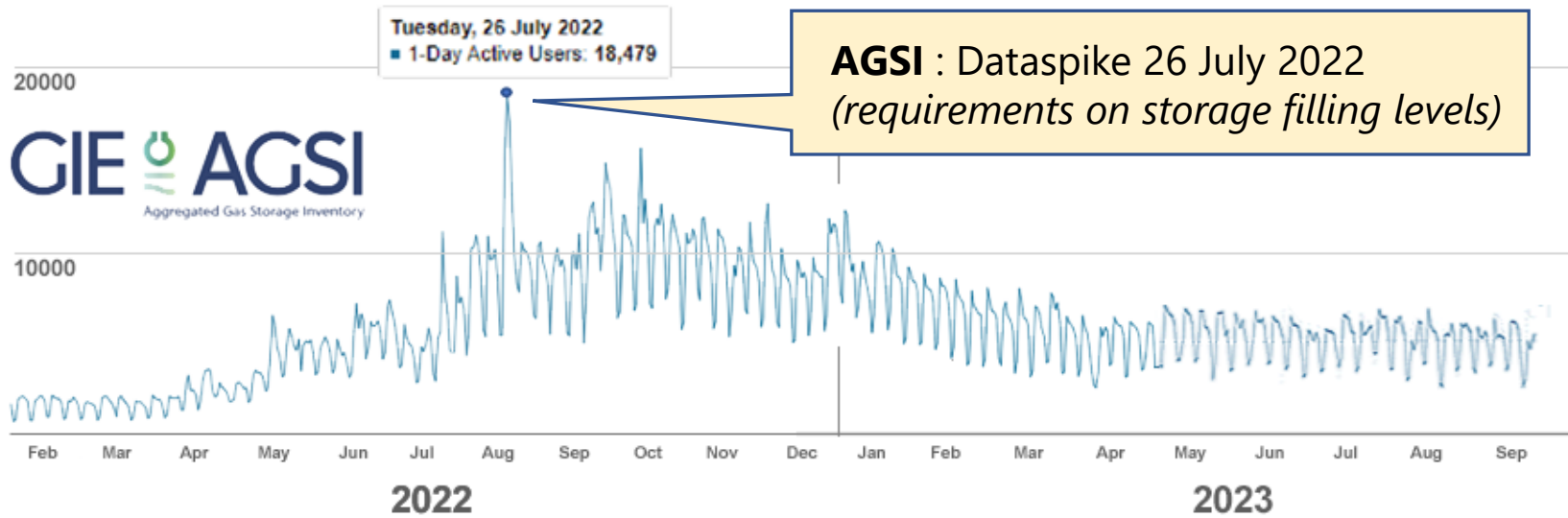


GIE ALSI
Aggregated LNG Storage Inventory

Current data coverage
100% of EU27 LSO



Data usage / Feb 2022 - Oct 2023



AGSI traffic

Oct 2023 : ~4800 users/day



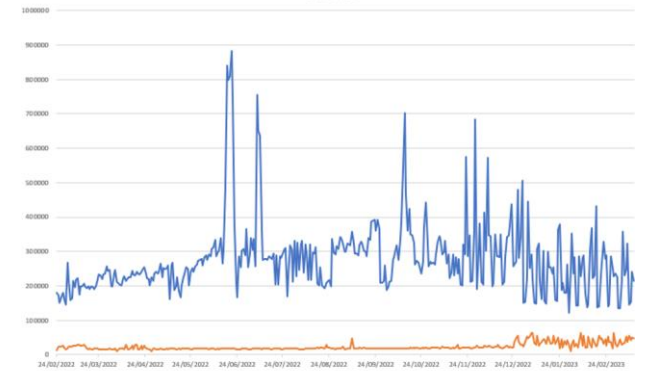
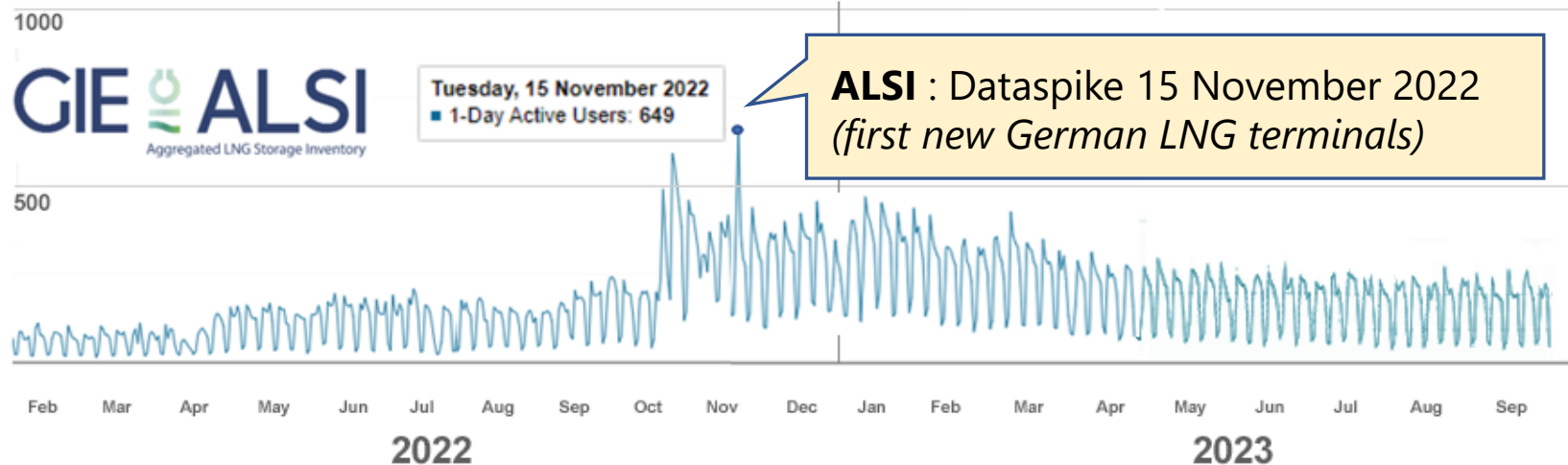
ALSI traffic

Oct 2023 : ~275 users/day



API traffic:

25000+ data calls per day
by 2000+ API users



— AGSI API traffic
— ALSI API traffic

Global stakeholders

Traders, analysts and journalists
Data re-used by commodity data providers



REUTERS

Bloomberg



Goldman Sachs

EU stakeholders

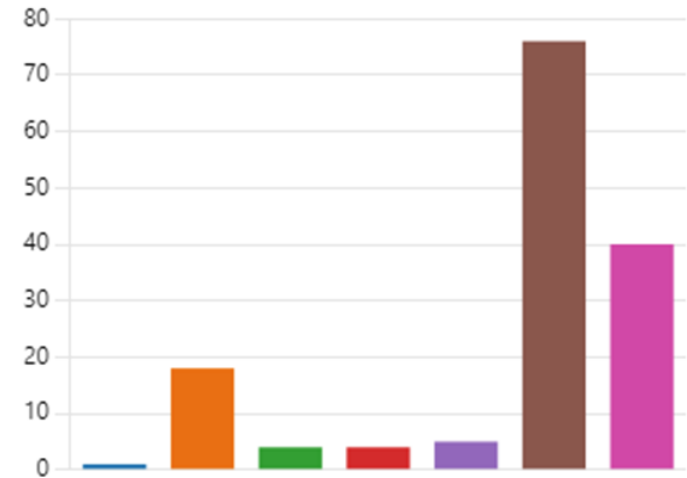
EC Gas Coordination Group
ACER, National Regulatory Authorities
Ministries of Energy

Country	Storage (MWh)	Capacity (MWh)	Utilization (%)	Change (MWh)	Change (%)
DE	1114,000	2,776,000	39.8%	29,500	2.6%
FR	95,140	161,387	58.9%	1,000	0.6%
BE	4,800	149,000	3.2%	0	0.0%
IT	1,700	100,000	1.7%	0	0.0%
ES	4,800	26,200	18.3%	0	0.0%
GR	42,000	90,000	46.7%	0	0.0%
PL	1,600	10,000	16.0%	0	0.0%
PT	131,000	406,000	32.3%	0	0.0%
RO	280,000	400,000	70.0%	0	0.0%
SK	47,000	107,000	43.9%	0	0.0%
UK	151,000	150,000	100.0%	0	0.0%
LU	21,000	11,000	190.9%	0	0.0%
NL	134,100	220,000	60.9%	0	0.0%
BE	27,200	220,000	12.4%	0	0.0%
FR	2,000	38,000	5.3%	0	0.0%
IT	34,000	114,000	29.8%	0	0.0%
ES	34,100	282,000	12.1%	0	0.0%
GR	24,000	100,000	24.0%	0	0.0%
PL	4,800	13,000	36.9%	0	0.0%

Area	From	To	%Full	Storage	Withdr
DE	78.82	1.80	Inject 2.52	18674.56	38.38
EU	78.31	-0.08		24374.52	
EU	77.66	-0.08		326.58	598.55

- Data available free of charge
- Data available via API service
- Data available for re-use / repackaging (source referral required)

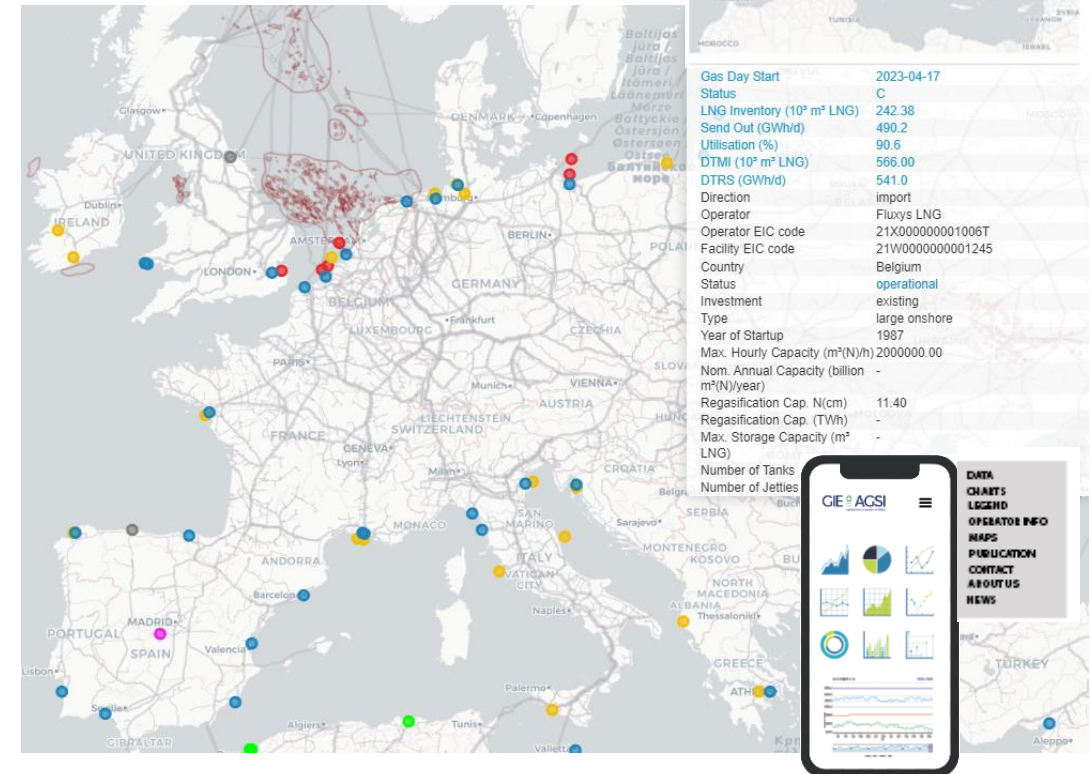
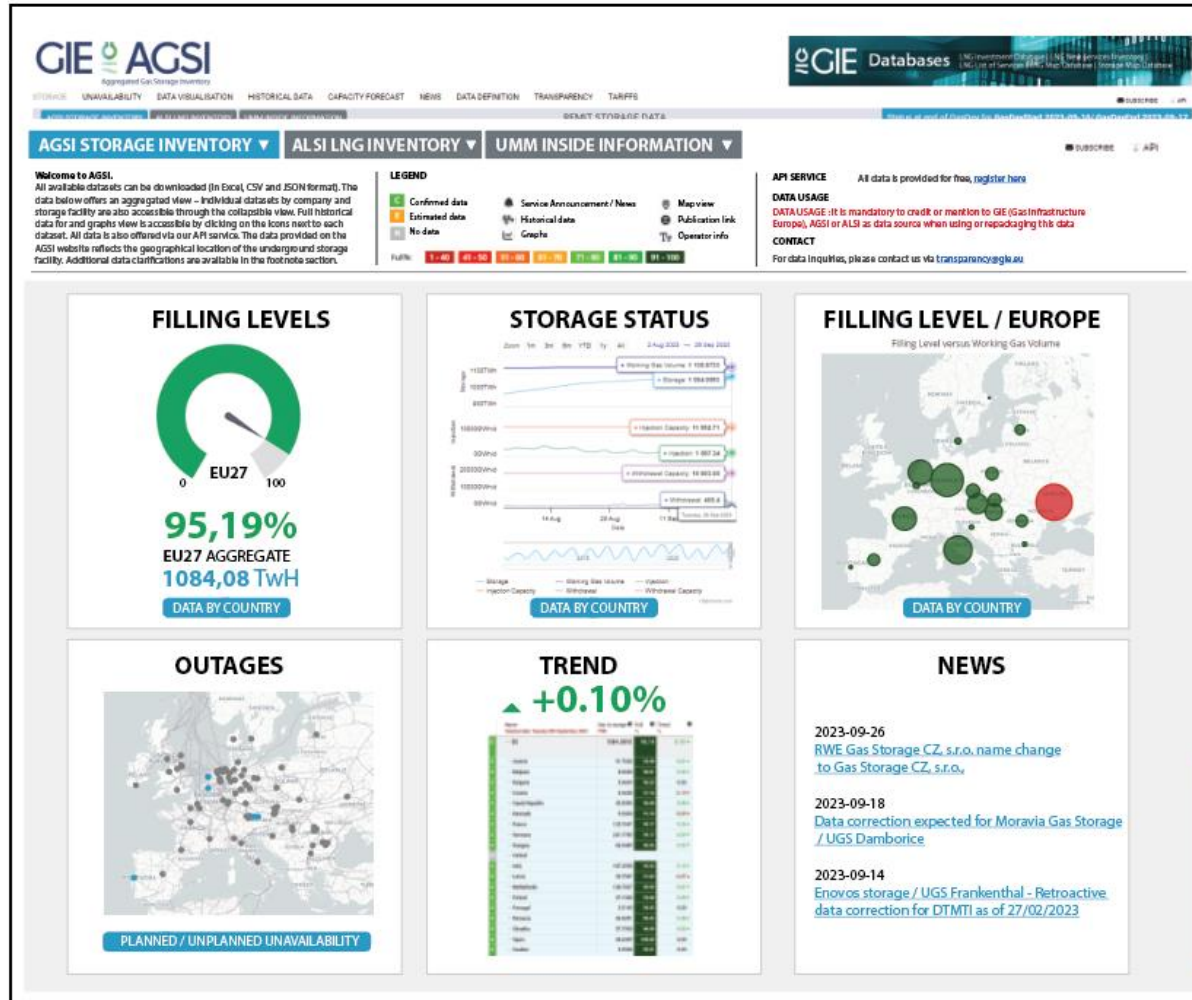
- Media
- Analyst
- Academia
- Financial sector
- European Institutions
- Industry
- Other



GIE Transparency Platforms

Ongoing enhancements

- **Data visualisation tools** (graphs, key data)
- **Interactive maps**
- **Mobile App**



Live demo

AGSI – ALSI – IIP

Avenue de Cortenbergh 100
1000 Brussels - BELGIUM

T +32 2 209 05 00
gie@gie.eu

@GIEBrussels
www.gie.eu

Thank you

For your attention

Avenue de Cortenbergh 100
1000 Brussels - BELGIUM

T +32 2 209 05 00
gie@gie.eu

@GIEBrussels
www.gie.eu

Annex

Additional information

Avenue de Cortenbergh 100
1000 Brussels - BELGIUM

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gie@gie.eu

@GIEBrussels
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5 new FSRU
in 2023



Deutsche ReGas



- IT **Piombino LNG terminal** (FSRU) // since 12.07.2023
- DE **Ostsee LNG Terminal** / Lubmin (FSRU) // since 04.05.2023
- DE **Brunsbüttel LNG terminal** (FSRU) // since 23.03.2023
- DE **Wilhelmshaven LNG terminal** (FSRU) // since 13.01.2023
- NL **EemsEnergy LNG terminal** (FSRU) // since 19.09.2022

7 more FSRU
expected



TotalEnergies



Deutsche ReGas



- FI **Inkoo LNG Terminal** (FSRU Exemplar) // operational
- FR **Le Havre LNG Terminal** (FSRU Cape Ann)
// end 2023 – start of commissioning phase
- DE **Stade LNG Terminal** (FSRU Transgas Force)
// end 2023 - start commissioning phase
- DE **Wilhelmshaven LNG Terminal** (FSRU 02 / Excelerate Excelsior)
// end 2023 - start commissioning phase
- DE **Ostsee LNG Terminal** // move from Lubmin > Mukran
// FSRU 1 in Q1 2024 (FSRU Transgas Power) – FSRU 2 in Q2/Q3 2024
- IT **Ravenna LNG terminal** (FSRU BW Singapore) // Q3 2024

LNG Regasification bookable capacity forecast

6 month forecast – availability per terminal

Operator	Feb 2023 28 days				Mar 2023 31 days				Apr 2023 30 days				May 2023 31 days				Jun 2023 30 days				Jul 2023 31 days			
	Commercial GWh	Booked GWh	Available GWh	Status	Commercial GWh	Booked GWh	Available GWh	Status	Commercial GWh	Booked GWh	Available GWh	Status	Commercial GWh	Booked GWh	Available GWh	Status	Commercial GWh	Booked GWh	Available GWh	Status	Commercial GWh	Booked GWh	Available GWh	Status
EU	154507.00	113639.00	35268.00		173101.00	119796.00	47105.00		165149.00	110663.00	48486.00		158403.00	102917.00	49286.00		155940.00	100457.00	49639.00		168086.00	108699.00	53344.00	
— Belgium	16191.00	16191.00	0.00		16191.00	16191.00	0.00		16191.00	16191.00	0.00		16191.00	16191.00	0.00		16191.00	16191.00	0.00		16191.00	16191.00	0.00	
— Flays LNG	16191.00	16191.00	0.00		16191.00	16191.00	0.00		16191.00	16191.00	0.00		16191.00	16191.00	0.00		16191.00	16191.00	0.00		16191.00	16191.00	0.00	
— Zeebrugge LNG Terminal	16191.00	16191.00	0.00	NA	16191.00	16191.00	0.00	NA	16191.00	16191.00	0.00	NA	16191.00	16191.00	0.00	NA	16191.00	16191.00	0.00	NA	16191.00	16191.00	0.00	NA
— Croatia	2227.00	2227.00	0.00		2465.00	2465.00	0.00		2386.00	2386.00	0.00		2465.00	2465.00	0.00		2386.00	2386.00	0.00		2386.00	2386.00	0.00	
— LNG Croatia	2227.00	2227.00	0.00		2465.00	2465.00	0.00		2386.00	2386.00	0.00		2465.00	2465.00	0.00		2386.00	2386.00	0.00		2386.00	2386.00	0.00	
— Kik LNG Terminal (FSRU)	2227.00	2227.00	0.00	NA	2465.00	2465.00	0.00	NA	2386.00	2386.00	0.00	NA	2465.00	2465.00	0.00	NA	2386.00	2386.00	0.00	NA	2386.00	2386.00	0.00	NA
— France	33098.00	33098.00	0.00		40757.00	40757.00	0.00		37145.00	37145.00	0.00		28118.00	28118.00	0.00		26814.00	25814.00	1000.00		36581.00	34481.00	2100.00	
— Elengy	12400.00	13400.00	0.00		13700.00	13700.00	0.00		12900.00	12900.00	0.00		10000.00	10000.00	0.00		8400.00	8400.00	0.00		13300.00	13300.00	0.00	
— Fos Tonkin LNG Terminal	1800.00	1800.00	0.00	NA	2000.00	2000.00	0.00	NA	2000.00	2000.00	0.00	NA	1800.00	1800.00	0.00	NA	1000.00	1000.00	0.00	NA	1800.00	1800.00	0.00	NA
— Montoir de Bretagne LNG Terminal	11900.00	11900.00	0.00	NA	11700.00	11700.00	0.00	NA	10900.00	10900.00	0.00	NA	8800.00	8800.00	0.00	NA	4400.00	4400.00	0.00	NA	11800.00	11800.00	0.00	NA
— Dunkerque LNG	10398.00	10398.00	0.00		14657.00	14657.00	0.00		13645.00	13645.00	0.00		8518.00	8518.00	0.00		11514.00	11514.00	0.00		12681.00	12681.00	0.00	
— Dunkerque LNG Terminal	10398.00	10398.00	0.00	NA	14657.00	14657.00	0.00	NA	13645.00	13645.00	0.00	NA	8518.00	8518.00	0.00	NA	11514.00	11514.00	0.00	NA	12681.00	12681.00	0.00	NA
— FOSMAX LNG	9300.00	9300.00	0.00		12400.00	12400.00	0.00		10600.00	10600.00	0.00		9600.00	9600.00	0.00		9900.00	8900.00	1000.00		10600.00	8500.00	2100.00	
— Fos Carouac LNG Terminal	9300.00	9300.00	0.00	NA	12400.00	12400.00	0.00	NA	10600.00	10600.00	0.00	NA	9600.00	9600.00	0.00	NA	9900.00	8900.00	1000.00	A	10600.00	8800.00	2100.00	A
— Germany	0.00	0.00	0.00		0.00	0.00	0.00		0.00	0.00	0.00		0.00	0.00	0.00		0.00	0.00	0.00		0.00	0.00	0.00	
— Deutsche Energy Terminal	0.00	0.00	0.00		0.00	0.00	0.00		0.00	0.00	0.00		0.00	0.00	0.00		0.00	0.00	0.00		0.00	0.00	0.00	
— Wilhelmshaven LNG Terminal 1 (FSRU)	0.00	0.00	0.00	NP	0.00	0.00	0.00	NP	0.00	0.00	0.00	NP	0.00	0.00	0.00	NP	0.00	0.00	0.00	NP	0.00	0.00	0.00	NP
— Greece	6289.00	5715.00	574.00		6962.00	5054.00	1908.00		6738.00	4867.00	1871.00		6962.00	5845.00	1117.00		6738.00	5654.00	1084.00		6962.00	5385.00	1577.00	
— DESFA	6289.00	5715.00	574.00		6962.00	5054.00	1908.00		6738.00	4867.00	1871.00		6962.00	5845.00	1117.00		6738.00	5654.00	1084.00		6962.00	5385.00	1577.00	
— Revithoussa LNG Terminal	6289.00	5715.00	574.00	A	6962.00	5054.00	1908.00	A	6738.00	4867.00	1871.00	A	6962.00	5845.00	1117.00	A	6738.00	5654.00	1084.00	A	6962.00	5385.00	1577.00	A
— Italy	14694.00	14694.00	0.00		16660.00	16660.00	0.00		15369.00	15369.00	0.00		14953.00	14953.00	0.00		15841.00	15841.00	0.00		15881.00	15881.00	0.00	
— Lithuania	2171.00	2171.00	0.00		3293.00	3293.00	0.00		2858.00	2858.00	0.00		2941.00	2941.00	0.00		3508.00	2724.00	940.00		3508.00	2724.00	940.00	
— Klaipėdos Nafta	2171.00	2171.00	0.00		3293.00	3293.00	0.00		2858.00	2858.00	0.00		2941.00	2941.00	0.00		3508.00	2724.00	940.00		3508.00	2724.00	940.00	
— FSRU Independence	2171.00	2171.00	0.00	NA	3293.00	3293.00	0.00	NA	2858.00	2858.00	0.00	NA	2941.00	2941.00	0.00	NA	3508.00	2724.00	940.00	A	3508.00	2724.00	940.00	A
— Netherlands	15100.00	15100.00	0.00		15100.00	15100.00	0.00		15100.00	15100.00	0.00		15100.00	15100.00	0.00		15100.00	15100.00	0.00		15100.00	15100.00	0.00	
— EemsEnergy Terminal	0.00	0.00	0.00		0.00	0.00	0.00		0.00	0.00	0.00		0.00	0.00	0.00		0.00	0.00	0.00		0.00	0.00	0.00	
— EemsEnergy LNG Terminal	0.00	0.00	0.00	NP	0.00	0.00	0.00	NP	0.00	0.00	0.00	NP	0.00	0.00	0.00	NP	0.00	0.00	0.00	NP	0.00	0.00	0.00	NP
— Gate Terminal	15100.00	15100.00	0.00		15100.00	15100.00	0.00		15100.00	15100.00	0.00		15100.00	15100.00	0.00		15100.00	15100.00	0.00		15100.00	15100.00	0.00	
— Rotterdam Gate Terminal	15100.00	15100.00	0.00	NA	15100.00	15100.00	0.00	NA	15100.00	15100.00	0.00	NA	15100.00	15100.00	0.00	NA	15100.00	15100.00	0.00	NA	15100.00	15100.00	0.00	NA

A Available

P Possible

under certain op. & reg. circumstances

NA Not available

NP Not published or auctioned yet



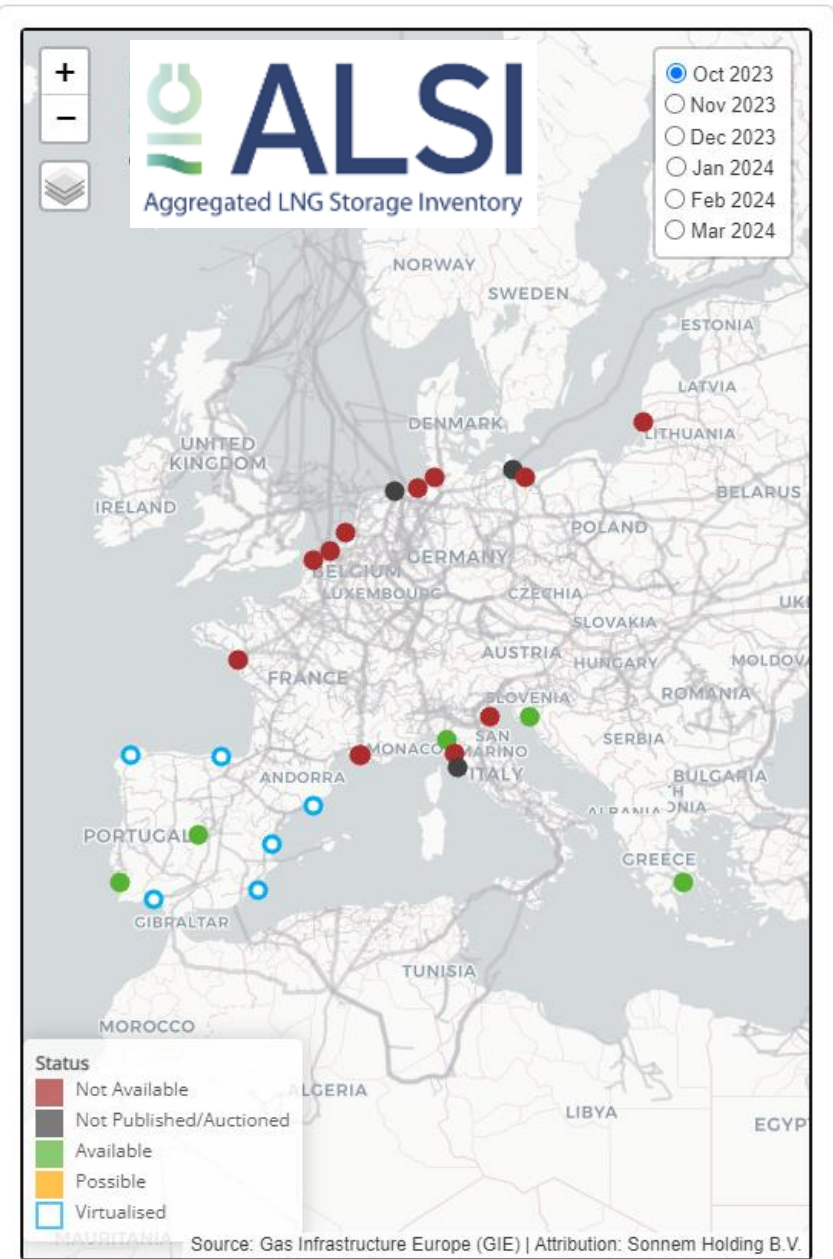
Website listing



Excel download



Map view



4. EDIG@S. 6.1 in use



Oliver Schirok
Data Exchange Manager & Chair edig@s WG
VNG Handel & Vertrieb

Edig@s 6.1 in use

The European message format for the gas market

Oliver Schirok

VNG Handel & Vertrieb

About EASEE-gas



EASEE-gas promotes and develops solutions for the simplification and streamlining of the trading and physical transfer of gas.

**FOUNDED IN
2002**

**80+
EUROPEAN
MEMBERS**

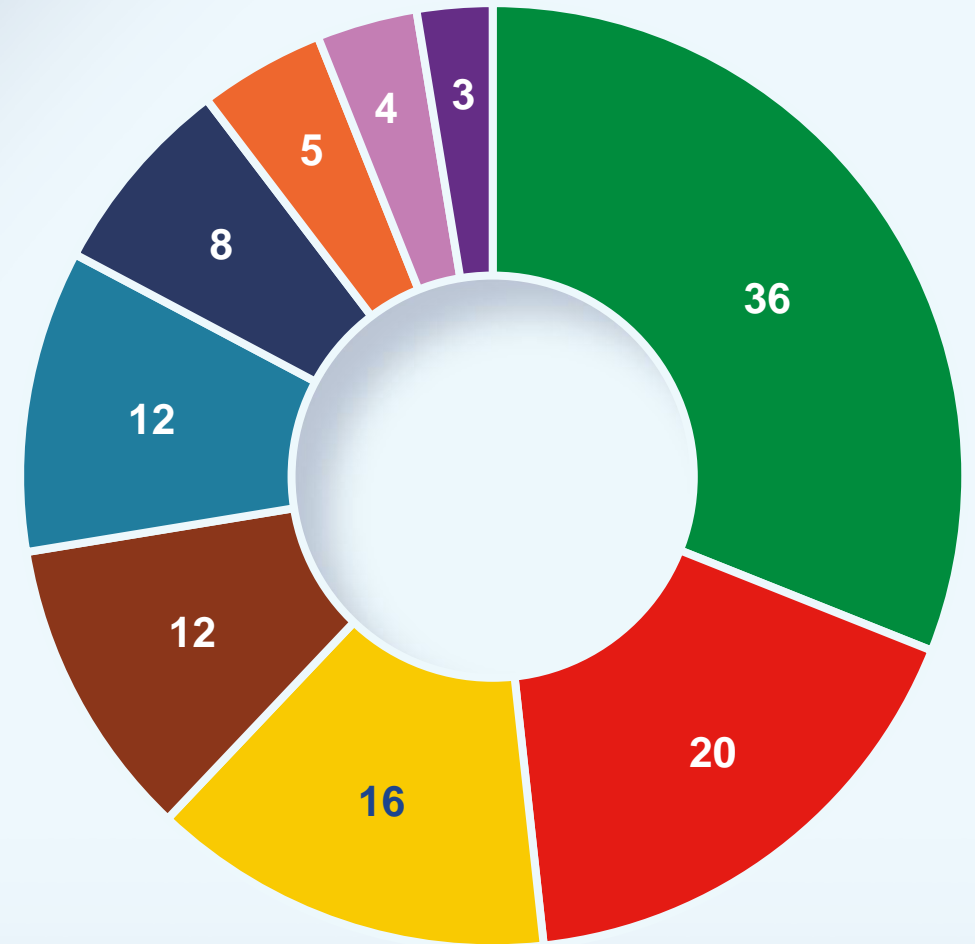
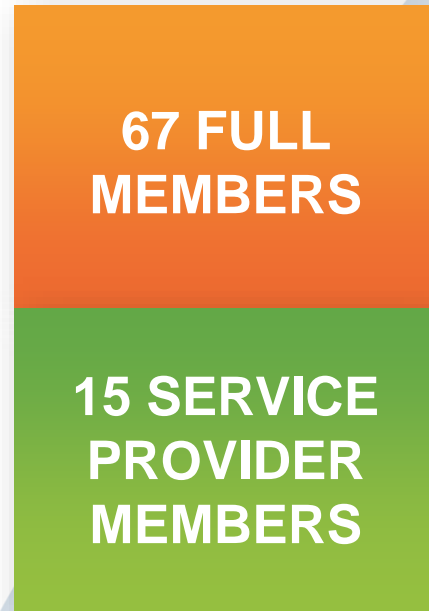


Represents the entire gas value chain



Membership by category

- Producers
- Transmission System Operators
- Distribution System Operators
- Storage System Operators
- LNG System Operators
- Traders & Shippers
- Suppliers
- End-users
- Prosumers
- Service Provider



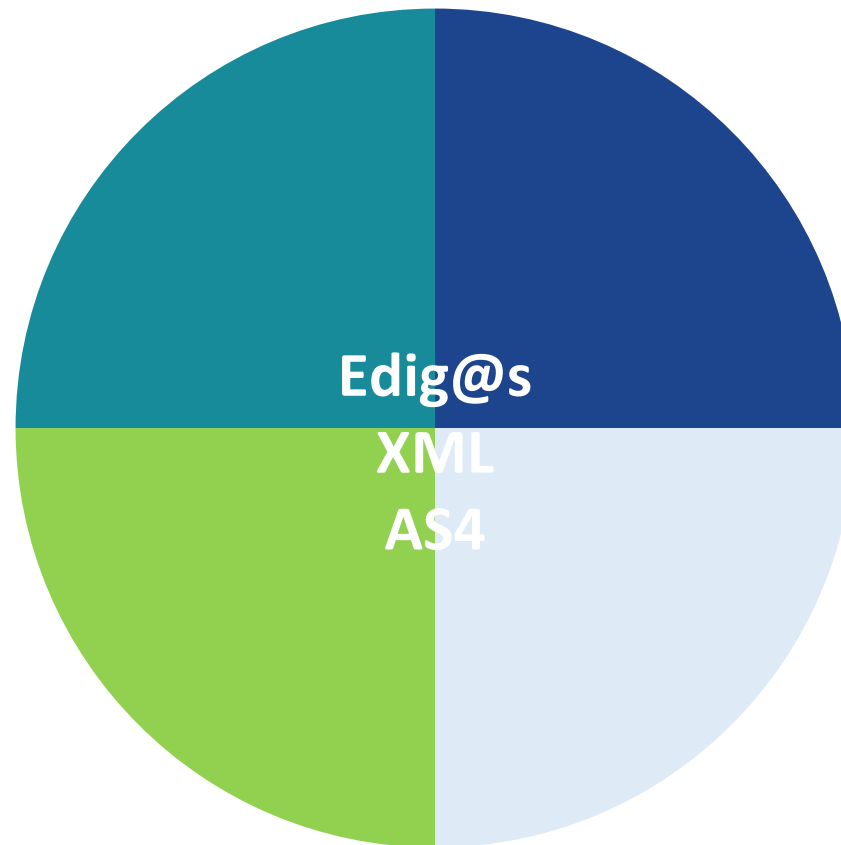
Members across Europe

- Producers
- Transmission System Operators
- Distribution System Operators
- Storage System Operators
- LNG System Operators
- Traders & Shippers
- Suppliers
- End-users
- Prosumers
- Service Provider



MWDWG Goal

- Nomination and Matching
- Balancing
- Settlement
- Capacity Allocation
- Other Processes



One solution that fits the business process for Europe.

Decreased IT costs.

Open markets for everyone.

Coordinated change of technology and format.

Digitalisation.

Give small BRPs the possibility to challenge the bigger BRPs in all markets.

Implementation status Edig@s 6.1



- Publication of Edig@s 6.1 February 2022
- First members are exchanging version 6.1 messages
- Phase 1: Nomination & Matching, OTC Gas Trading, General Process
- Phase 2: Balancing & Settlement, Capacity Allocation, System Operation

TSO adoption plans (July 2023)

Implementation status 6.1	Count of TSOs
6.1_implemented. Testing requested.	5
6.1 adopted	5
6.1_In_Planning	21
6.1 adoption plan for Q2 2023	1
6.1 adoption plan for Q3 2023	1
6.1 adoption plan for Q4 2023	2
6.1 adoption plan for 2024	5
6.1 adoption plan for Q1 2024	8
6.1 adoption plan for Q2 2024	1
6.1 adoption plan for 2025	1
Awaiting TSO reply	1
6.1 adoption in planning - under analysi	1
No plans to adopt 6.1 - Supports 4/5.1.	14
Interactive only	3
Total nr. TSOs	43

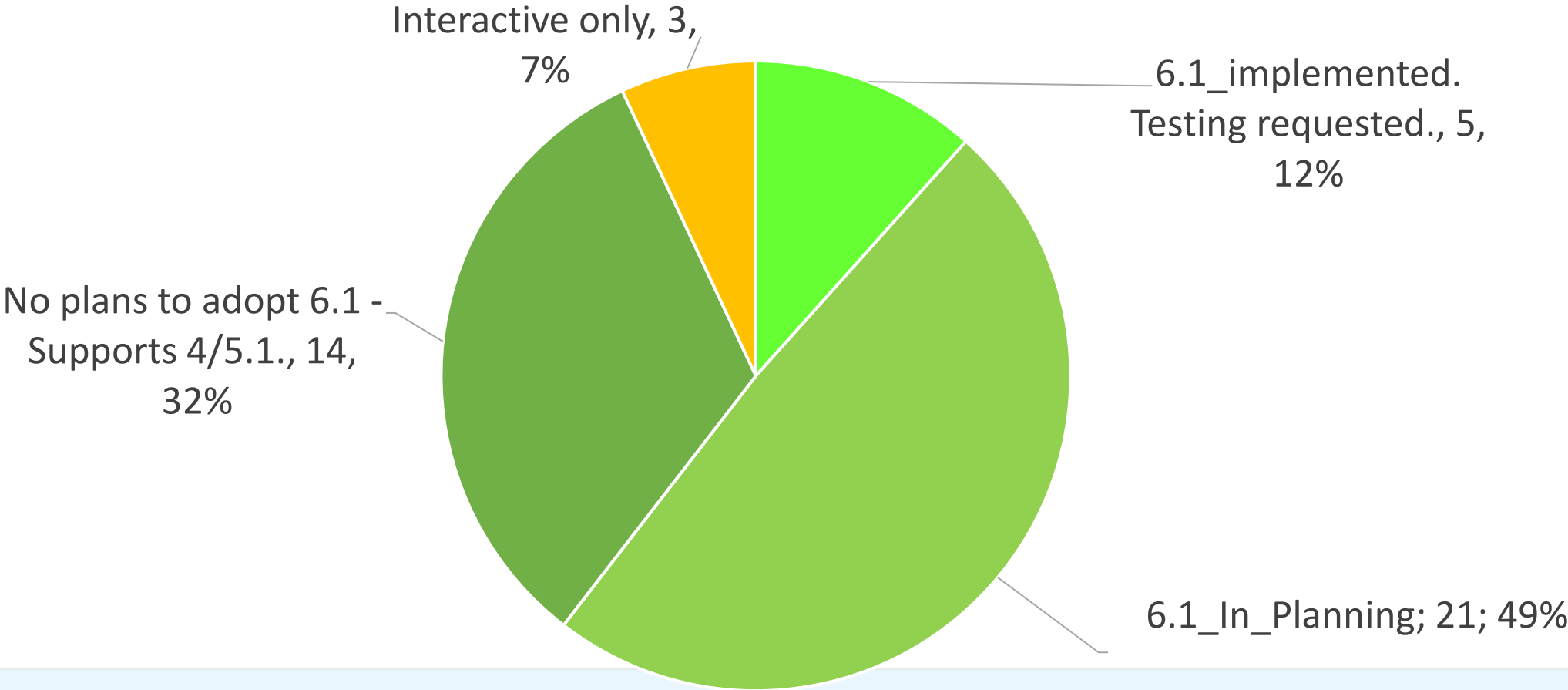
Notes:

Adopted = In test

In planning = Scheduled for a given Qtr and year

No plans = BUT will support 6.1 on counterparty request

TSO adoption plans (July 2023)



Key implementation benefits

- Harmonised solution fit for market needs
 - Less routing due to more business logic
 - Decision tables & message examples for better validation
- Additional business processes covered
- Increased visibility on matching for BRP's
- Future proof – new processes in Hydrogen transport or CO2 storage will only be implemented in Version 6 and beyond

Hydrogen in version 6

- Version 6 easily adaptable for future processes
- No active maintained business processes or requirements of the regulation
- EASEE-gas CBP „Hydrogen Quality Specification“
- Edig@s 6.1 codelist updates

Parameter	Unit	Min	Max
Hydrogen	mol-%	98,0	-
Carbon monoxide	ppm	-	20
Total sulphur content ¹	mg S/m ³ (n) ²	-	21 ⁽³⁾
Carbon dioxide	ppm	-	20
Hydrocarbons (including Methane)	mol-%	-	1,5 ⁽³⁾
Inerts (Nitrogen, Argon, Helium)	mol-%	-	2,0
Oxygen	ppm (mol)	-	10 ^(4,5)
Total halogenated compounds	ppm (mol)	-	0,05
Water dewpoint	°C at 70 bar(a)	-	- 8
Hydrocarbon dewpoint ³	°C at 1-70 bar(a)	-	- 2 ⁽³⁾

edig@s® EASEE-gas



Thank
you for your
attention! 😊



Stay updated:
EASEE-gas

5. Update on EASEE-connect



Wim de Olde
Enterprise architect & Secretary TSWG
EASEE-gas



© Wim de Olde

EASEE-connect

Wim de Olde, secretary TSWG

AI disclaimer: All images in this presentation are created with a prompt in DALL-E 3

Update on EASEE-connect...

THIS IS NOT A DEMO!



How to set-up an AS4 connection?

*Fiddely
diddely*



Et voilà

What are we trying to solve?



Problem: Time & money

Are you aware of the fact that your integration team or contractor spends time on: **Getting the right contact persons from parties?**



EASEE-connect

The trusted platform for AS4/AS2 profiles

Problem: Time & money

Are you aware of the fact that your integration team or contractor spends time on: **Getting the right parameters for the technical implementation?**



IP-address?

UPN fields?

Firewall settings?

Version?

URL?

EASEE-connect

The trusted platform for AS4/AS2 profiles

Problem: Time & money

Are you aware of the fact that your integration team or contractor spends time on:

Getting the right security certificate(s)?

Public certificate?

Private certificate?

Signing?

Encryption?



EASEE-connect

The trusted platform for AS4/AS2 profiles

We have the solution!



**Increase efficiency and quality
of information**

Save time and money

**Avoid mistakes
and mitigate security risks**



EASEE-connect functionality

Members:

 Gasunie Transport Service...

RELATION PARTY PROFILE CERTIFICATE COMPANY SWITCH PARTY MY ACCOUNT [LOGOUT](#)

- Company management (a company can have multiple parties)
- Party management
- Certificate upload and management
- Profile management (technical parameters)
- Relation management
- “My Account” management

Administrator (secretariat):



- Management companies/parties (procedures in place)
- Management user access



Address book

Address book functionality

- All contacts in one place
- Contacts also Visible in Relations page (invite function) and downloadable

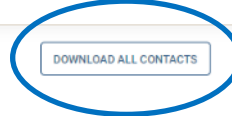


Edit Company

Name

Parent/Representin Company Name

Relation



Existing relations

Equinor & BBL Company Agreement
Gasunie Transport Services B.V. & BBL Company Agreement
BBL Company & TESTYURI 1 Party Name P1Request

Search for new relations

Click to invite the party

Name	EIC code		
GasOne	AAAAAAAAAAAAA		
Gassco	21X-NO-A-A0A0A-2		
Gasunie Transport Services B.V.	21X-NL-A-A0A0A-Z	GUN	<input type="button" value="INVITE"/>
Thyssengas delegated by David Magryta	21X-DE-G-A0A0A-U	RTGTSO	<input type="button" value="INVITE"/>

Name	Phone Number	Email
Business		
Jeroen Zanting	0031012344578	jeroen@gasunie.nl
Production Support		
Nimbus-T (operation)	0031123432879	operation@gasunie.nl
Technical		
Wim de Olde	003112789234789	wim@gasunie.nl

Phone Number	Email	
031012344578	jeroen@gasunie.nl	<input type="button" value="REMOVE"/> <input type="button" value="EDIT"/>
031123432879	operation@gasunie.nl	<input type="button" value="REMOVE"/> <input type="button" value="EDIT"/>
03112789234789	wim@gasunie.nl	<input type="button" value="REMOVE"/> <input type="button" value="EDIT"/>

Profiles

Manage your technical profiles for communication and create relations

Profiles

Select profile

Profile

GTS acceptance all A06 documents (from: 2018-09-27, to: 2021-09-27)



GTS Nomination Production (from: 2018-09-27, to: 2021-09-09)



Production (from: 2021-10-01, to: 2023-12-09)



CREATE NEW PROFILE



Profile 'GTS Nomination Production'

SAVE

Relation

DOWNLOAD ALL CONTACTS

Existing relations

Fluxys & Gasunie Transport Services B.V. Agreement

Equinor & Gasunie Transport Services B.V. Agreement

Gasunie Transport Services B.V. & Gassco P1Request

GMSL & Gasunie Transport Services B.V. Agreement

ENI & Gasunie Transport Services B.V. Agreement

ENGIE SA & Gasunie Transport Services B.V. Agreement

ECC & Gasunie Transport Services B.V. Agreement

Action

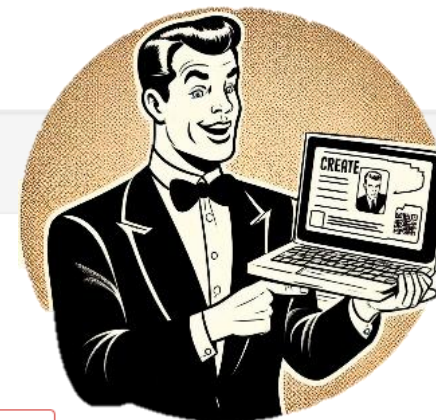


End date of profile tied to end date certificate

Validity

Start date 2018-09-27

End date 2021-09-27



Certificates

Certificates can be **uploaded** and **managed**

Check on right certificate – **no private key!**

Certificates

Name	Created on	Valid until	Thumbprint
Gasunie Transport Services B.V.	2018-09-27	2021-09-27	4A0A6F6FA969D6174D78I
Gasunie Transport Services B.V.	2020-12-09	2023-12-09	FA4586409E7520A9502E

Certificates

Name	Created on	Valid until	Thumbprint
Gasunie Transport Services B.V.	2018-09-27	2021-09-27	4A0A6F6FA969D6174D78DC49E09CC5D285E02899
Gasunie Transport Services B.V.	2020-12-09	2023-12-09	FA4586409E7520A9502EA288FEF746B91CE2F0A4

✖

You uploaded a wrong certificate type

OK

New Certificate

Certificate name

Certificate text

—BEGIN CERTIFICATE—

SAVE

New Certificate

Certificate name

Certificate text

TZKf8AUUUnJGIMN+45THmOKM/ZU3tQRROIKE8UgrW803AYZU5JMXLgrWRP/YIK
 NUX3NZBFH4yKiviDD+BnYQc
 —END PRIVATE KEY—

SAVE

A new certificate can be received through the “Certificate Update” message.



Agreement between party's

- Agreement “by invitation”
- Technical settings can be downloaded (future: standard CPPA3 format for automatic import in local application)

```
{ "parties": [
  { "eicCode": "21X-BE-A-A0A0A-Y",
    "signing_certificate": "@!^#&* ",
    "encryption_certificate": "@!^#&* ",
    "client_ipv4": "168.58.46.55",
    "clientOutboundIp": "168.58.46.60 & 168.58.46.61",
    "server_address": "b2b.fluxys.com:8383" },
  { "eicCode": "21X-NL-A-A0A0A-Z",
    "signing_certificate": "@!^#&* ",
    "encryption_certificate": "@!^#&* ",
    "client_ipv4": "168.20.46.55",
    "clientOutboundIp": "168.20.46.60 & 168.20.46.61",
    "server_address": "prp.gu-messaging.com" },
  "documents": [],
  "agreementRef": "http://entsog.eu/communication/agreements/21X-BE-A-A0A0A-Y/21X-NL-A-A0A0A-Z/21" }
```

Agreement 'Production from 2021-10-1'

Name: Production from 2021-10-1

Agreement Ref: http://entsog.eu/communication/agreements/21X-BE-A-A0A0A-Y/21X-NL-A-A0A0A-Z/21

Fluxys
Role: Undefined
Profiles: Fluxys Production
document types for profile

Gasunie Transport Services B.V.
Role: ZSO
Profiles: Production
document types for profile

Available Documents to use for this agreement

Service	Direction	Document Type Code	Action
A02	All receives from All	87G	+
A06	ZSO receives from ZSO	26G	+
A06	ZSO sends to ZSO	26G	+

SAVE DOWNLOAD CANCEL

This information can be used in de AgreementRef Update message. Possibility to insert a custom value.

Authentication

Two factor authentication (2FA) by email or Authenticator app

 [Back to EASEE-connect](#) Hello gasunie@quintor.nl [Log out](#)

Manage your account

Change your account settings

[Profile](#)

[Password](#)

Two-factor authentication

[Personal data](#)

Two-factor authentication (2FA)

To enable two-factor authentication you can setup an authenticator app or if you have confirmed you e-mail address you can receive a token per e-mail.

[Disable 2FA](#)

Authenticator app

[Add authenticator app](#)



Log in

Use a local account to log in.

Email

Password

Remember me?


[Log in](#)

[Forgot your password?](#)

Two factor authentication code



EASEE-gas <noreply@easeegas.eu>

Aan  Olde de W.B. (Wim)

Your 2FA code: 371841



EASEE-Connect
gasunie@quintor.nl

933 204 



Two-factor authentication

Your login is protected with Email 2FA. Enter the code you received by e-mail below.

Authentication code

Remember this machine

[Log in](#)

It is highly recommended to use a **group email account** of the company's operational team.

This reduces the administration burden at EASEE-gas and avoids risks because the company responsibility is to take care of access to this operational email account.



Summary

Approx. 18 companies are using EASEE-connect.

EASEE-connect is an easy to use digital platform developed by EASEE-gas whereby gas **market participants can create and manage** their AS4 and AS2 company **profiles and portfolio of business connections** in a simple and secure way.

- EASEE-connect replaces the e-mail and telephone conversations regarding technical connection parameters
- Up-to-date contact details of communication partners in one application
- By using EASEE-connect, companies have access to an automated profile management.

More information at
<https://easee-gas.eu/easee-connect> (check the video!)
and <https://easeeconnect.eu/>



EASEE-connect
The trusted platform for AS4/AS2 profiles

License model

Licenses (on yearly basis)

- Standard license = 1 to 5 profiles
- Premium license = 6 to 15 profiles
- Platinum license = no limit in n° of profiles

Full **EASEE-gas members**

- Basic +0 (value €750) , Premium +€1000, Platinum +€2500

Paying **non-members** (only for the EASEE-connect service)

- Basic € 750, Premium €2000, Platinum +€3500

Non-members not paying

(companies with very limited amount of connections, by invitation of a paying subscriber)

- Restricted access: only maintenance of own profile





**The trusted platform for
managing all of your
AS2/AS4 connections.**

Thank you for your attention
easeeconnect.eu



6. EASEE-gas certificate change & the Agreement Update



Dirk Serruys (Fluxys)
Chair TSWG EASEE-gas

Is it confusing sometimes?

Business
Party

EASEE-connect

AS2

Agreement
Update

Security
Certificates

AS4

Communication
Party

Certificate
Exchange

Edigads

In the beginning there was ...

Life was easy,
only a handful of messages a day between
producers and TSO's
to manage the European gas operations

TELEX

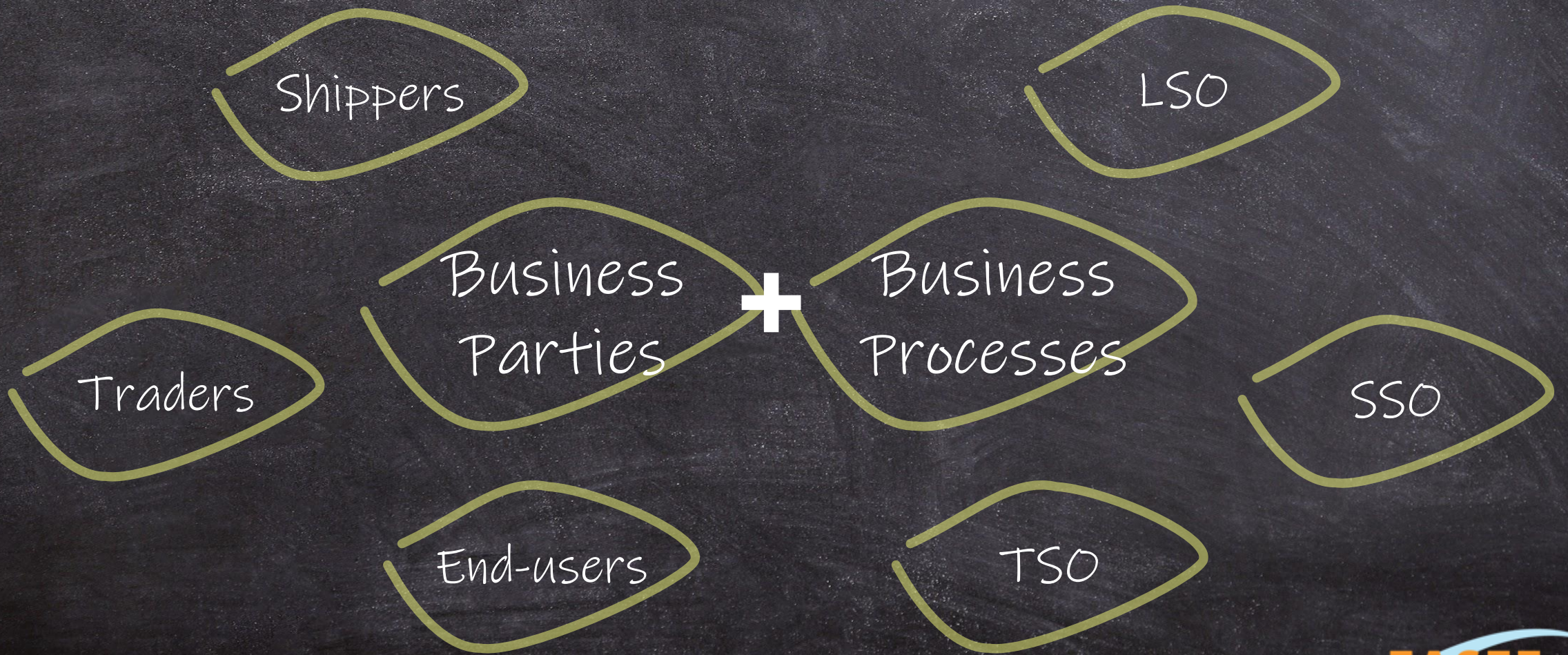
In the beginning there was ...

Context has changed radically,
Thousands of messages need to be
processed in realtime between multiple
stakeholders each day



TELEX

Where does this complexity come from?



3 building blocks

network



(by NC)

Transmission
protocol

AS4

(by NC)

Message
format

Edig@s

(by NC)

Everything fine and dandy ...
(on paper)

But what about

Interoperability

CNOT

Exchange of data parameters

Interoperability

On the level of the network

The IETF has this covered

On the level of AS4

ENTSO-g AS4 profiles are there to support us
We need to be careful about alternatives. A few differences could ruin interop!

On the level of message format

Edigads MIG from EASEE-gas is widely adopted
we know there are variants

Management and Exchange of config parameters

A lot of configuration parameters are specified within the ENTSO-g AS4 profile and can be inferred

Parameters that change over time, like security certificates, are handled manually → error prone and security risk

In the future the rate of these changes could increase
E.g. more keys to manage or shorter validities

Management and Exchange of config parameters (cont.)

As we speak, we are within a certificate renewal project
The MoC2023

Because it is a lot of 'manual labour', these kinds of projects are particularly challenging

If the number of participants is high → coordination is high

Not future proof, the MoC2023 will probably be the last in its kind

Management and Exchange of config parameters (cont.)

The solution to all this is 'AUTOMATION'!!!

In 2020 ENTSO-g issued the approach to automation but adoption is lagging

The APPEAL

For companies who didn't implement it yet

Talk to your ICT/messaging team to have this on the roadmap

For companies who have implemented it

Thank you and please **spread the word!!** Encourage counterparties to switch to automatic exchange of certificates/parameters

Coffee break 13:45 - 14:05



7. AS4: eDelivery rationale for AS4 updates



Bogdan Dumitriu
EC eDelivery
Directorate-General for
Informatics (DIGIT)

Informatics (DIGIT)
Directorate-General for

eDelivery AS4 profile

*Bogdan Dumitriu,
EC DG DIGIT*



17 October 2023, 3rd Workshop on Data Exchange and Cybersecurity
in the Energy Sector

Digital Europe Building Blocks



A **Building Block** is an open and reusable digital solution.

What?

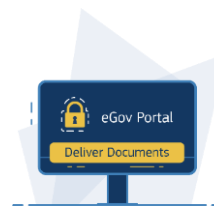
It can take the shape of **frameworks, standards, software products or software as a service (SaaS)**, or any combination thereof.

How?

It promotes the adoption of the same **open standards and technical specifications** by the **different sectors** of the Union for the most basic & common functionalities of their projects or platforms.

Why?

Building Blocks enable interoperability across borders and sectors.



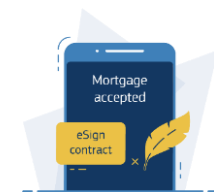
eDelivery

Exchange online data and documents reliably and securely.



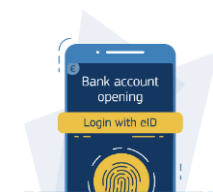
eInvoicing

Promote the implementation of the European standard for electronic invoicing across borders.



eSignature

Create and verify electronic signatures between businesses and EU citizens.



eID

Allow citizens to prove who they are across borders, making it easier to access online services in another EU Member State.



Buy

Buy a compliant, interoperable solution from the market.



Reuse

Reuse sample software available through Digital Europe.



Build

Build an EU-compliant solution from scratch based on Building Block standards.

eDelivery-powered digital ecosystems






eDelivery Service offering




SOFTWARE

Sample software maintained by the EC (with documentation)



Access Point (AP)  



Service Metadata Publisher (SMP) 

Service Metadata Locator (SML) 


OPERATIONS SERVICES



Managed services

Public Key Infrastructure (PKI)  

Service Metadata Locator (SML)  

Testing services

Connectivity testing 

Conformance testing  

Supporting services


Training & Deployment  

Service Desk  

STAKEHOLDER MANAGEMENT SERVICES

Onboarding services (for stakeholders)

Self-assessment tool

Onboarding of new stakeholders 

Cost estimation tool

Community management services

Developers Community

Market guide

TECHNICAL SPECIFICATIONS

Access point specifications

SMP specifications

SML specifications

Security control guidance

Trust models guidance

Guidance on digital certificates

STANDARDS OF SOs

Standards monitoring

 **Service offering Description (SoD)**

 **Service Level Arrangements (SLA)**

 **eLearning, videos, success stories**

Digital Europe platform

2014

Created and piloted by
Member States

Powered by the European Commission



2023

Available to anyone



Connecting Europe
Facility (2014-2020)



Digital Europe
Programme (2021-2027)

Once-Only  |
Technical System



And more...

AS4 security update: rationale and approach



Cryptography and Internet security continues to evolve

- Current profile is still secure but is no longer leading edge
- New algorithms and key types based on elliptic curve cryptography are commonplace and their use is expected for new applications and protocols
 - IETF RFC 9231 allows their use in XML Security, WS-Security and AS4
- By aligning with state-of-the-art security we provide continuity and investment protection

Approach

- Continue to promote eDelivery as a cross-domain, general purpose solution
- Independent experts (cryptography, info sec) and IETF editor for support



eDelivery AS4 2.0 message layer security

Message encryption

- ECDH allows two parties to jointly agree on a shared secret using an insecure channel.
- ECDH-ES mode involves a stable shared recipient public key
- Optional ECDH-full ephemeral mode in combination with new ebCore Certificate Update (enhancement)

eDelivery AS4 2.0 message layer security

Message signing

- Mandatory support (Common Profile) for Ed25519 (elliptic curve signature algorithm using EdDSA and Curve25519)

Message encryption

- Mandatory support for key agreement for encryption using X25519 (elliptic curve Diffie-Hellman key exchange using Curve25519). AES-128 continues to be used for encryption.





eDelivery AS4 2.0 message layer security

Alternative message encryption

- Optional support (enhancement) for ECDSA (for cryptographic agility and/or interoperability with some MS scheme)
- The consultation is launched with mandatory support for Ed25519 and X25519 and optional support for ECDSA and Brainpool curves
- The specification may yet be revised to mandate support for both options in the Common Profile

eDelivery AS4 2.0 transport layer security

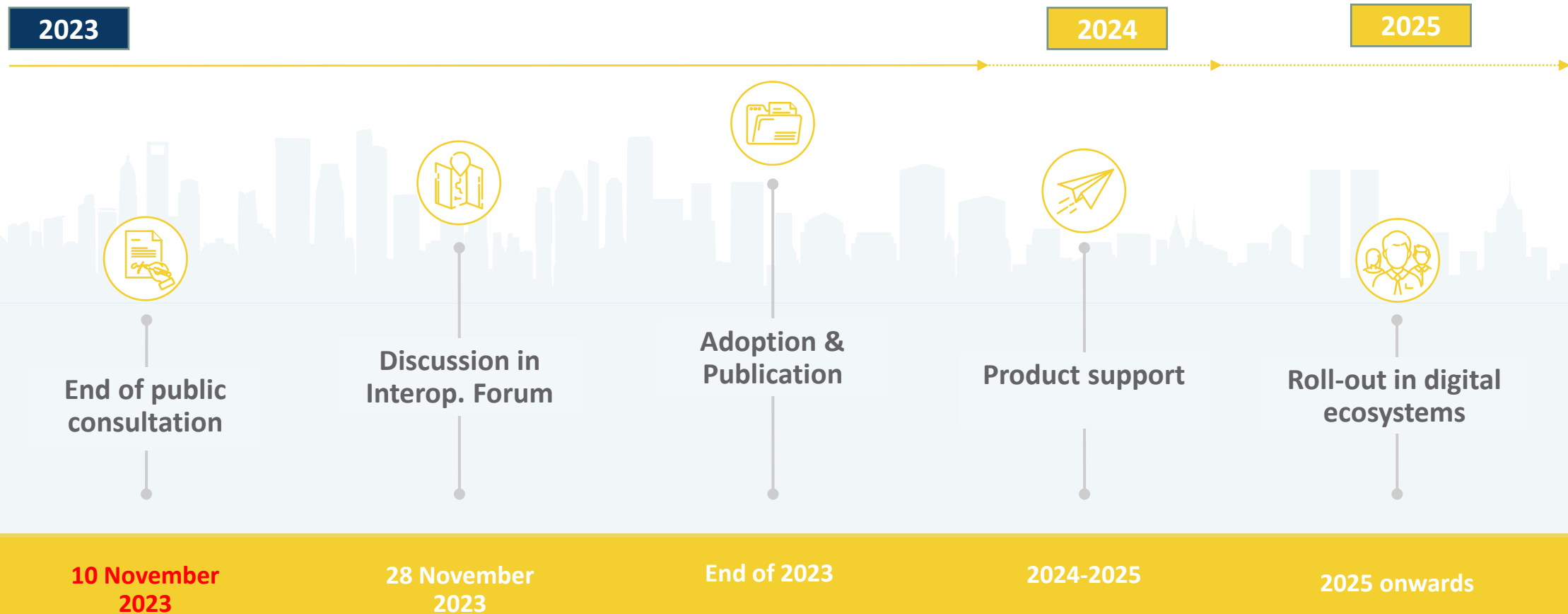


- Support for TLS 1.3
- Modern curves





Update roadmap



Consultation page: <https://europa.eu/!vTCbyx>

Learn more about eDelivery

Stay in touch!



eDelivery User Community

The eDelivery User Community space enables stakeholders to share experiences and best practices on the exchange of electronic data and documents between public administrations, businesses and citizens. Pan-European projects (re)using eDelivery have their own sub-communities within this space.

Register for personalised eDelivery news

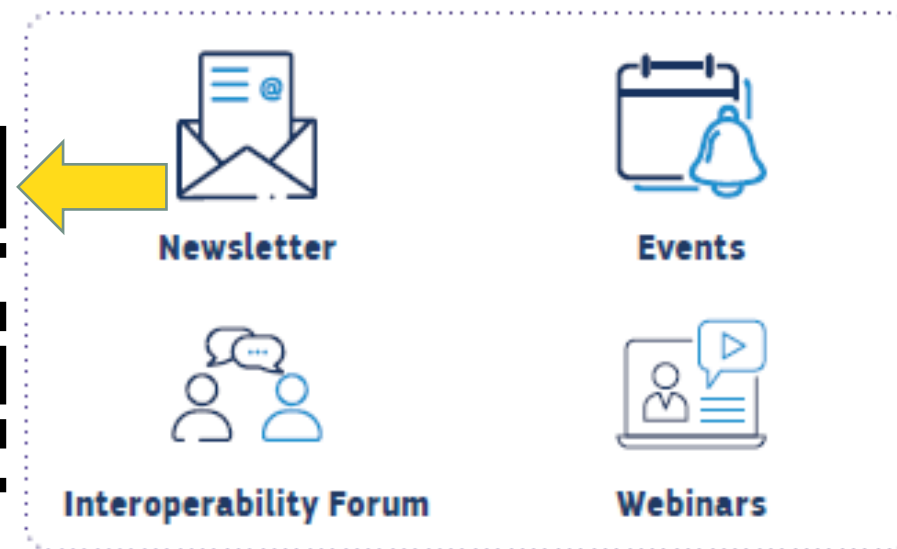
[here](https://europa.eu/!8rtpfj)  <https://europa.eu/!8rtpfj>

More about eDelivery

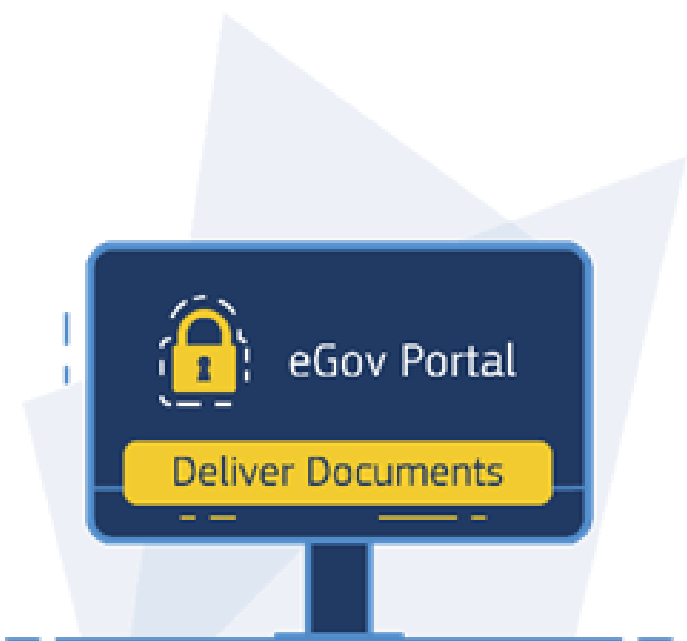
 @edeliveryBB

 <https://europa.eu/!hwcjvy>

 [eDelivery events \(DEP\) - YouTube](#)



Have a question?



eDelivery

Exchange data and documents
online reliably and securely



Bogdan Dumitriu



To continue the conversation,
contact our team via email

Emails:

EC-digital-building-blocks@ec.europa.eu



EC-eDelivery-support@ec.europa.eu



Thank you

& stay in touch



eDelivery features



Standardised protocol

The eDelivery public interface is based on OASIS/ISO ebMS3/AS4, further refined by the eDelivery AS4 profile. Cross-domain and cross-project interoperability is facilitated by using the same standardized protocol.

Interoperability

Interconnecting systems based on open standards already used in countless other projects provides further interoperability opportunities after initial creation.

Security, accountability and reliability

The eDelivery AS4 profile has built-in secure exchange of data (encrypted) in a reliable way (one-time message delivery with retries). AS4 acknowledgement receipts provide accountability and non-repudiation of receipt.

Scalability

eDelivery solutions can continue to be used even when the number of participants/messages in the network grows.

Payload and business agnostic

eDelivery is payload- and business-agnostic. Once created, the network can be reused to support arbitrary new workflows and datasets.

Asynchronous messaging

The eDelivery AS4 profile is asynchronous. Synchronous communication can be emulated through various techniques.

Mature solution

eDelivery is already used in production in tens of projects across Europe with varying sizes and needs.

Vendor-neutral

eDelivery specifications are not proprietary or controlled by one vendor alone. eDelivery is available in multiple products and solutions from different vendors to choose from.

Cost-efficient

Reusing an existing and proven building block that benefits from public investment of millions of euro and ongoing funding is more cost-efficient than developing a custom solution.

8. ENTSOG's new AS4 profile & improved security features



Pim van der Eijk
Sonnenglanz Consultancy

ENTSOG AS4 background



- ENTSOG started its work on AS4 in 2013 in preparation for the Network code on interoperability and data exchange rules (COMMISSION REGULATION (EU) 2015/703)
- The gas sector used a variety of other existing protocols that were no longer state of the art
- Adoption of AS4 was an opportunity to adopt a common European standard for many years of secure interoperable data exchange
- AS4 was successfully shown to be interoperable in a proof-of-concept involving several TSOs and their solution providers
- AS4 is a configurable protocol, so it requires a “usage profile” that more precisely documents the specific configuration to be used
- “ENTSOG AS4” is such a usage profile that is aligned in functionality with existing implementation guidelines of EASEE-gas for AS2

ENTSOG AS4 functionality (1)



- One-way “Push” messaging
- Reliable messaging
 - Retries, receipt acknowledgements, duplicate detection
 - Allows automated recovery from (temporary) system or network unavailability
- Secure messaging
 - Transport and message level
 - Messages and receipts are signed using certificates (integrity, non-repudiation)
 - Payloads are encrypted at transport level and message level (confidentiality)
 - State-of-the-art algorithms following ENISA guidelines

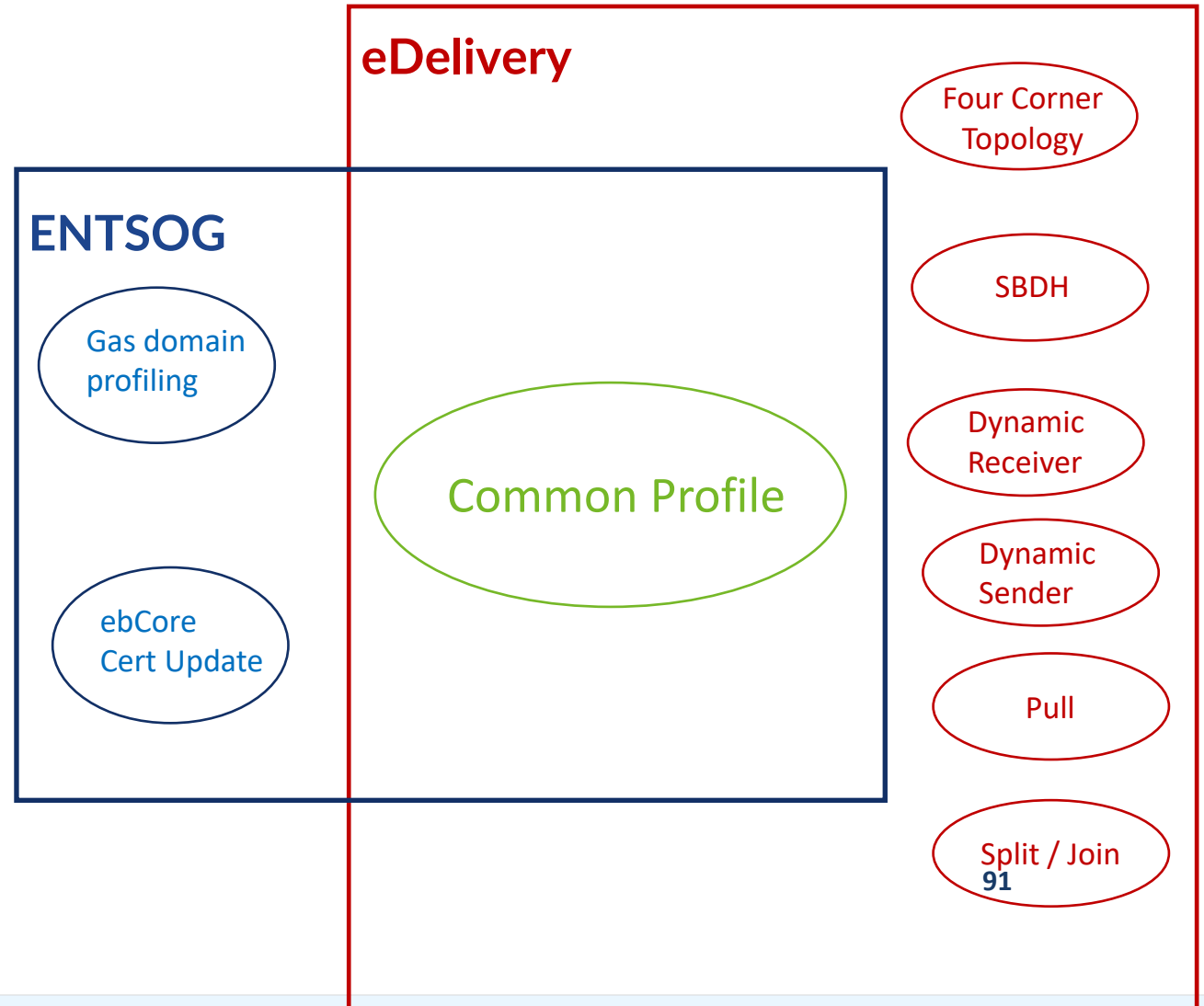
ENTSOG AS4 functionality (2)



- Networking
 - Requirement to use the Internet for exchange
- Compression
 - Reduces the size of messages
- Domain profiling:
 - Edig@s XML payloads
 - Guidelines for the content of AS4 headers: service, action, roles, part properties
- New feature for certificate exchange using ebCore Agreement Update was added in 2016

ENTSOG AS4 and eDelivery AS4

- EC eDelivery has its origins in EU pilot projects from the same period as ENTSOG's work
- ENTSOG's early proof-of-concepts confirmed the readiness of AS4
- Generic feature set is the same as ENTSOG
- A shared "Common Profile" among many different communities creates economies of scale
- ENTSOG benefits from EC services such as conformance testing



OASIS ebCore Agreement Update (1)

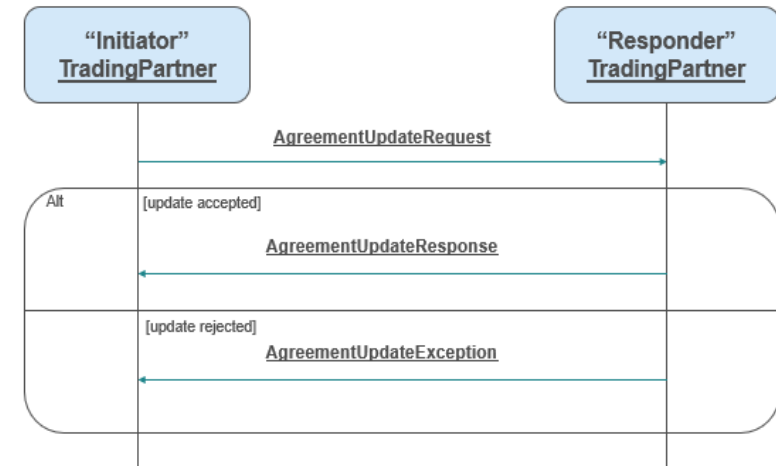
ebCore Agreement Update is an OASIS specification for interoperable message-based updating of messaging configurations.

ENTSOG was one of the first user communities requesting it:

- More flexible alternative process for managing certificates

Certificate update

- Signing, encryption, key exchange certificate updates
- Sharing short-lived, partner-specific key exchange public keys



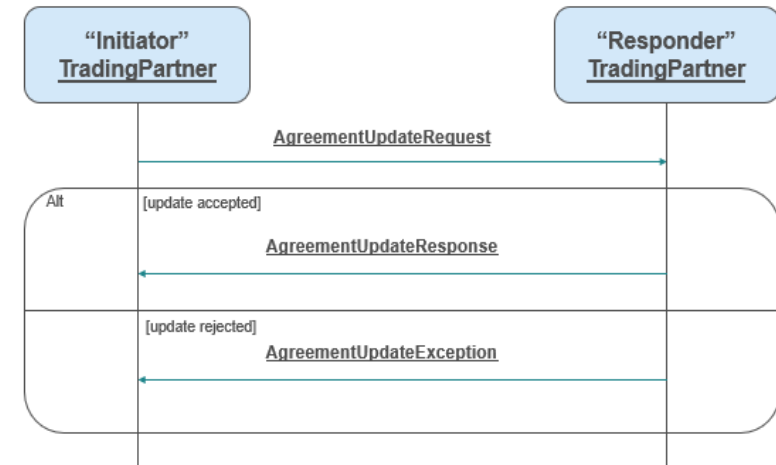
OASIS ebCore Agreement Update (2)

OASIS TC intends to provide an endpoint update feature

- Endpoint URLs, profile versions, algorithms, network security updates
- This has been requested by some eDelivery users, not (yet) by ENTSOG

Benefits

- Automation for direct trust / mutual exchange networks
- No dependency on central services
- Approximates full ephemeral ECDH



ENTSOG AS4 status (1)

- ENTSOG AS4 is in stable production use
 - No changes since version 3.6, March 2018
 - Available from [the ENTSOG site](#)
 - Several Member States also use it at national level
 - Certificate Update has not yet replaced the EASEE-gas “migration of certificates” approach
- A draft version 4.0 is available for review:
 - Updates the security section
 - Quite similar to the AS4 profile developed by BDEW for German energy sector
 - Aligned with the draft eDelivery AS4, developed in close collaboration with the eDelivery team
 - ebCore Agreement Update to also become an optional feature in eDelivery

ENTSOG AS4 status (2)

- Limited feedback on draft profile, likely because
 - No changes to end-user functionality
 - The changes are very technical and low-level
 - Low priority as low perceived urgency to change
- Potential issues:
 - Draft follows “leading edge” recommendations by cryptographers; but certification Authorities are conservative in their service offerings
- ENTSOG ITC KG is working on roadmaps and other additional implementation documents

Coffee break 15:05 - 15:25



9. AS4 from a Service provider perspective



Christoph Malzer
Business Development Manager
Navitasoft

DID YOU EVER SEND AN ENCRYPTED
ZIP FILE ? AND YOU THOUGHT
IT WOULD BE SAFE ?



AS4 V4.0

Christoph Malzer

CONTENT

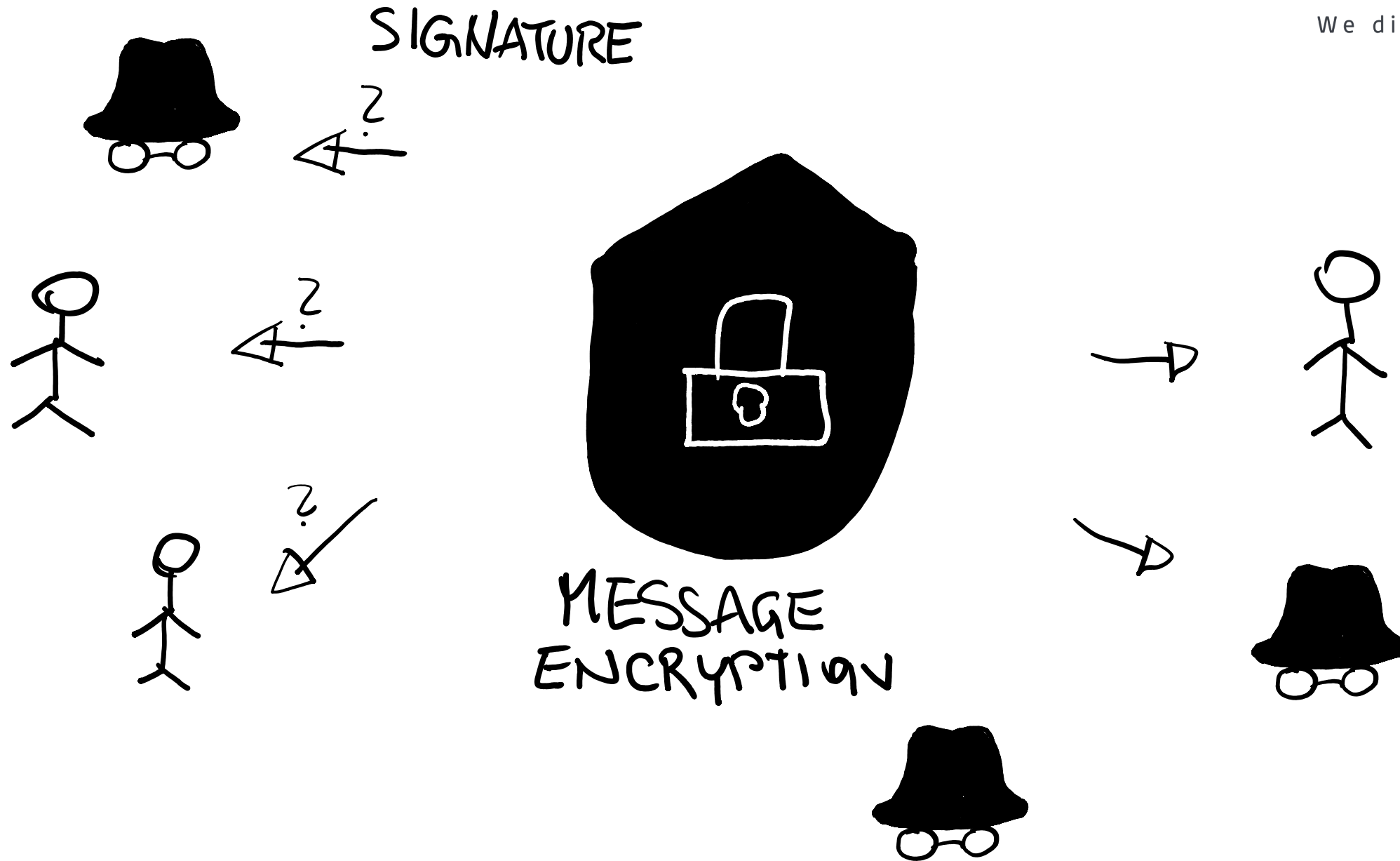
SIGNATURE VS. ENCRYPTION

DIFFERENT KEYS

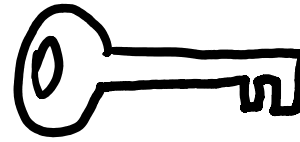
KEY GENERATION

AS4 V4.0

BENEFITS



SYMMETRIC



ASYMMETRIC



PUB.



PUB



ELLIPTIC CURVE

PER SESSION

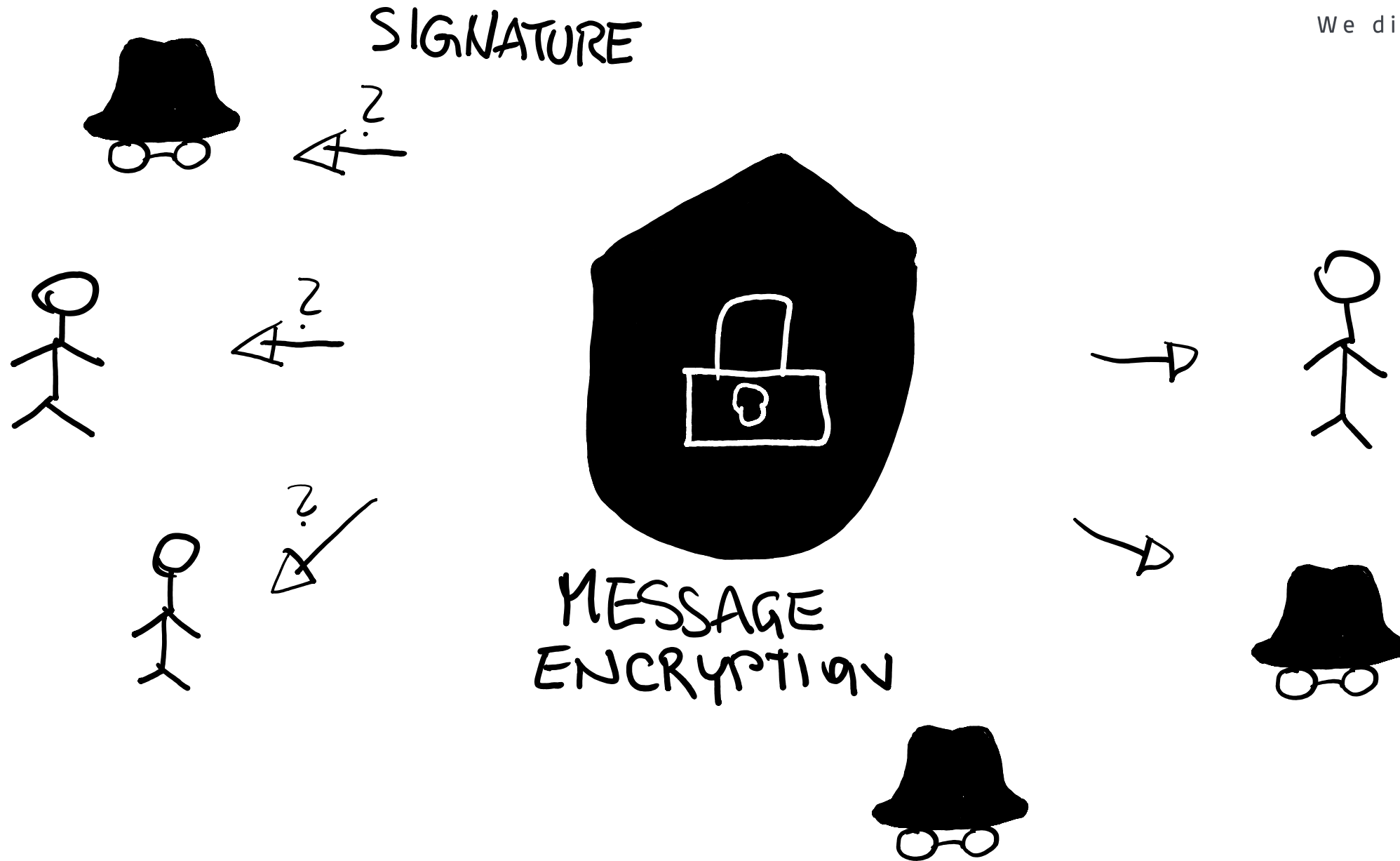
RIVEST-SHAMIR-ADLEMAN

LONGER TERM USE

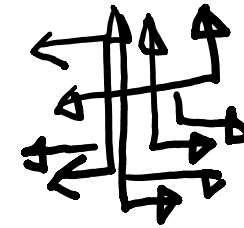
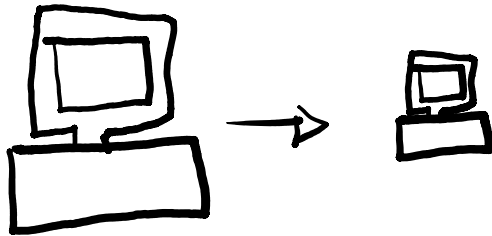
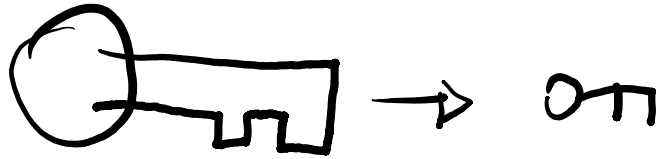
KEY SIZE: RSA 2048 ~ EC 224 BIT

AS4 V4.0

- SUPPORT FOR ECDH
- SIGNING Ed 25519 (based on RFC 8410, RFC 9231)
ELLIPTIC CURVE
 - ↳ ASYMMETRIC KEY
- MESSAGE ENCRYPTION AES-GCM
 - ↳ SYMMETRIC KEY



BENEFITS



Navitasoft provides commercial software solutions for System Operators and Energy Traders



For power and gas TSOs, Storage operators and DSOs.

Operator Suite



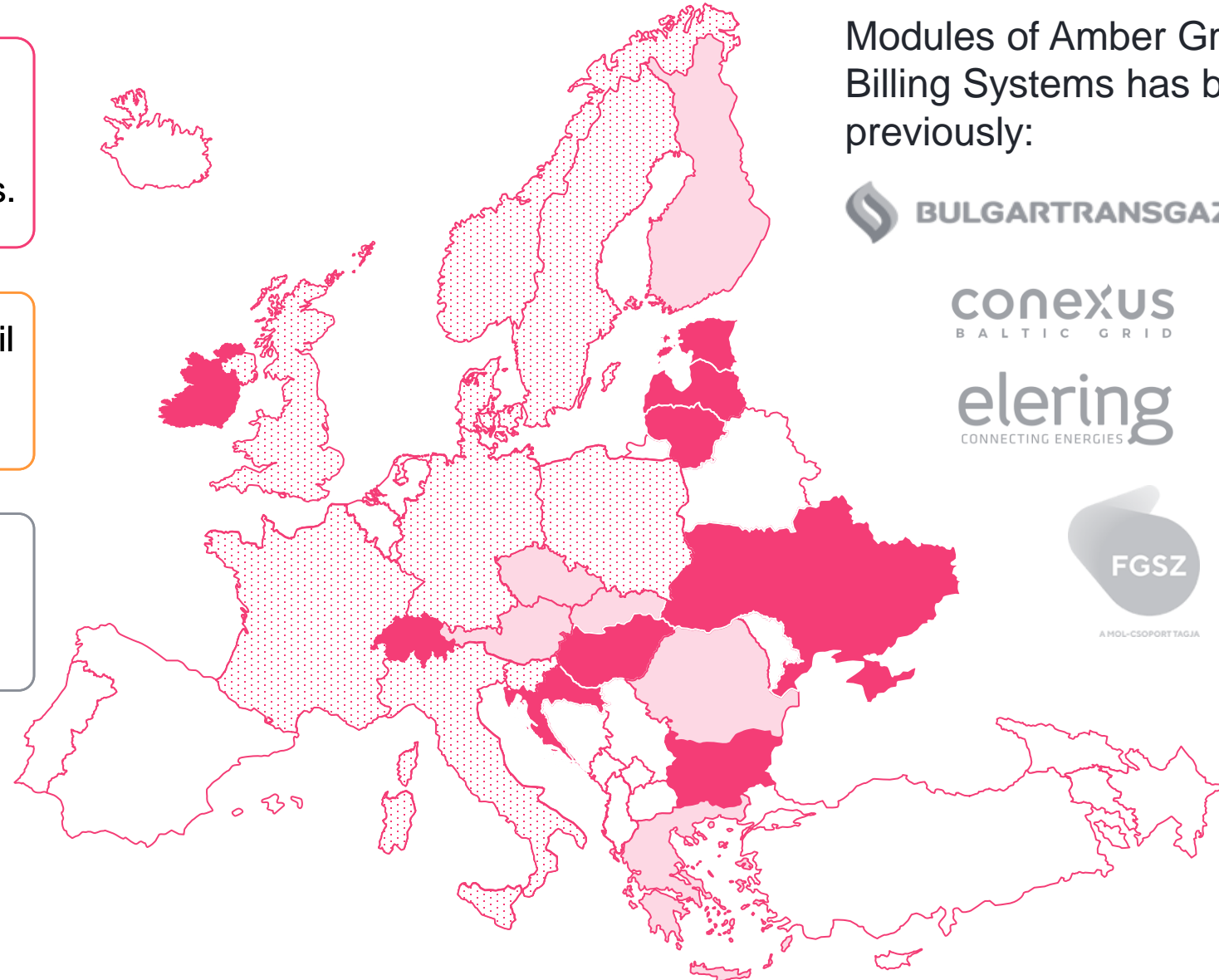
Wholesale and retail energy trading systems

Trader Suite



Automated data exchange with TSO & MO

Com. Suite



Modules of Amber Grid's new Billing Systems has been used previously:





Christoph Malzer

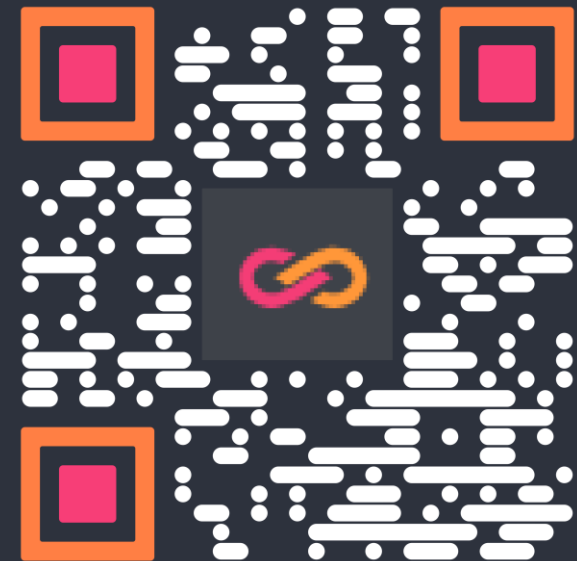
Business Development Manager

+43 660 9228 289

christoph.malzer@navitasoft.com

<https://www.linkedin.com/in/christoph-malzer-energy/>

Thank you for your
attention!

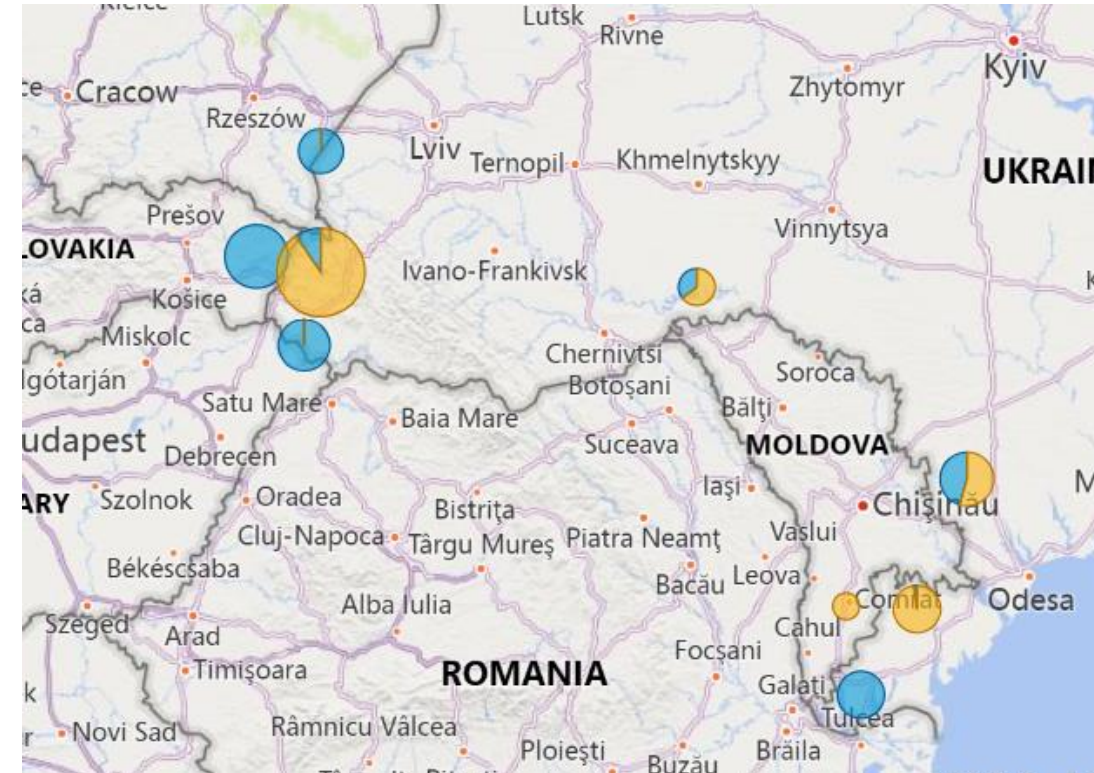


10. Ukraine TSO: CNOTS in application

Andrii Prokofev
Head of division
Division of cooperation with clients
LLC Gas TSO of Ukraine

LLC Gas TSO of Ukraine (ENTSOG Observer status)

- Gas TSO of Ukraine
 - ~33 000 km of pipeline
 - 57 Compressor Stations
 - 1389 Distribution stations
 - 5 active IPs with EU TSOs + IPs with Moldova
- Interoperability Network Code implemented at 5 cross-border points with EU TSOs



LLC Gas TSO of Ukraine CNOTs in use



- Goal: usage of EU and harmonized solutions at all IPs with EU TSOs

Data exchange solutions at IPs with EU TSOs

- AS4 ENTSOG profile
- edig@s 5.1
- edig@s and AS4 for nomination and matching procedures

Benefits of applying ENTSOG's CNOTs

- ✓ Proven and designed especially for the gas sector
- ✓ Written into EU Regs (NCs) UA can easily adhere to these by using the same tools as adjacent TSOs
- ✓ CNOT documentation and xsds (msgs) are free and maintained
- ✓ ENTSOG AS4 is a stable, secure and reliable comms protocol
- ✓ Cost of development and main of proprietary tools prohibitive
- ✓ No 'invented here' syndrome – CNOTs are developed for all

Path forward for UA and ENTSOG's CNOTS



- Continue the gradual adoption and harmonisation
- edig@s 6.1 adoption (when requested by counterparties)
- Potentially migrate to ENTSOG's new AS4 profile for increased security

11. New gases and Hydrogen - Fit for purpose?



Jarle Ronnevik
Lead Analyst Equinor
Equinor



Sheringham shoal supplies around
280000 households in UK.

Natural gas and Hydrogen

Possible to use existing systems, formats and cnot's?

By: Jarle Rønnevik, Lead Analyst Equinor ASA

Equinor ambitions | Net Zero by 2050

- Hydrogen Ambitions:
- 3-5 Major industrials clusters
- Clean hydrogen projects by 2035
- >10%
- Clean hydrogen market share in Europe by 2035

- A net zero carbon future will need hydrogen at scale
- We are developing both **renewable-based (green) hydrogen** and **low-carbon (blue) hydrogen** by using low emission natural gas from the Norwegian Continental Shelf (NCS)
- We believe both are needed to meet the projected demand for hydrogen in line with decarbonization target.

Hydrogen Value Chain

Feedstock

Electricity from renewable sources

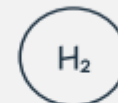


Production

Electrolysis



Output



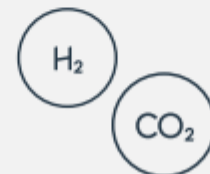
Link to CCS value chain

The CO₂ is transported to the injection facility, injected and safely stored at depths typically > 1 km below the sea bed

Low emission natural gas from the NCS



Natural Gas Reforming



Different kind of projects

- Closed systems where hydrogen factories are built in areas with a lot of industry
 - The industry and energy source is built close to each other and over production can be transported away for sale and under production of energy need to have alternative energy recourses.

- Transport systems where hydrogen and co2 is transported in pipelines.
 - Research is ongoing to see if the same equipment (natural gas) can be used for Hydrogen.
 - Some new rules and potential messages are needed if there will be a mixing process where hydrogen is mixed with natural gas.

Hydrogen

- Hydrogen is a lighter molecule than methane (natural gas), this means that that Hydrogen have a higher leakage danger.
- Hydrogen is a pure elements H₂, the absence of carbon is the major driver to use Hydrogen.
- Hydrogen is much more flammable than natural gas and flame speed is 10 times higher than natural gas. The flame range for Hydrogen is 4%-75% while natural gas range is between 7%-20%. This means safety becomes very important.
- You need three times the volume of Hydrogen to get the same energy from Hydrogen compared to natural gas with current technology.

Hydrogen safety properties are very different from natural gas

Property	Methane	Hydrogen	Comment hydrogen versus methane
Flammable range in air	5-15%	4-75%	7x wider
Maximum burning velocity	0.4 m/s	2.7 m/s	6x higher
Minimum ignition energy	0.29 mJ	0.017 mJ	15x lower
Added N ₂ in air to inert	37%	73%	Ratio Added N ₂ :AIR 4.5x higher for H ₂
Minimum oxygen level	12%	5%	People cannot breathe N ₂ -inerted H ₂ mixture
Detonation initiation energy	1000 g TNT	1 g TNT	1000x lower, DDT is a real concern for H ₂
Detonation cell size	30 cm	1 cm	DDT can happen at small scale with H ₂
Density relative to air	0.55	0.07	8x lighter
Sonic speed	460 m/s	1290 m/s	2.8x higher release velocity
Stoichiometric in air	9.5%	29.6%	3x higher
Combustion energy LFL	0.5 MJ/m ³	2 MJ/m ³	4x lower
Boiling point	111 K	20.4 K	LH ₂ -sprays will freeze O ₂ and N ₂ in air
Density at BP relative to air	1.5	1.03	LH ₂ sprays dense due to air cooling

Use of existing formats and rules?

- Our opinion:
 - Extra challenges creates a need for automation and message exchange. From my point of view, it would be an advantage to use existing format (edig@s) to handle the same processes for Hydrogen that is covered. Some adjustments may be needed.
 - A decision should be taken around granularity of the transport and processes:
 - Should blue hydrogen follow the gas day and the green hydrogen follow the calendar day?
 - Should natural gas start to use calendar day together with blue and green hydrogen?
 - Should all follow the gas day?
 - Existing network codes should be adjusted to cover the safety challenges connected to hydrogen but most of the other rules are already fit for purpose.

Advantages to use what is already in place for Natural Gas

- Easee-gas and Entso-g have worked for decades to harmonising and streamlining the natural gas industry.
 - Common format for many of the processes already exist and can most likely be used as it is or with small adjustments:
 - Transport
 - Capacity
 - Buy/sell
 - Market information
 - Allocations
 - Safe and reliable communication protocol AS4 that all transport system operators is obliged to use.
- When your system works in one country in Europe it will in most cases work in all countries in the European Union.
- The above point have decreased the IT investments needed to have a functional gas market for all players.
- For natural gas it took almost 20 years to harmonising and streamlining the gas market, do we really want to reinvent the wheel when most of the existing network codes, formats and BRS documents can be used with small adjustments?



Thank you. Questions?

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12. Gasunie, CNOTS for hydrogen



Onno Wesselink
New Business Integration Manager
Gasunie NL

Gasunie NL

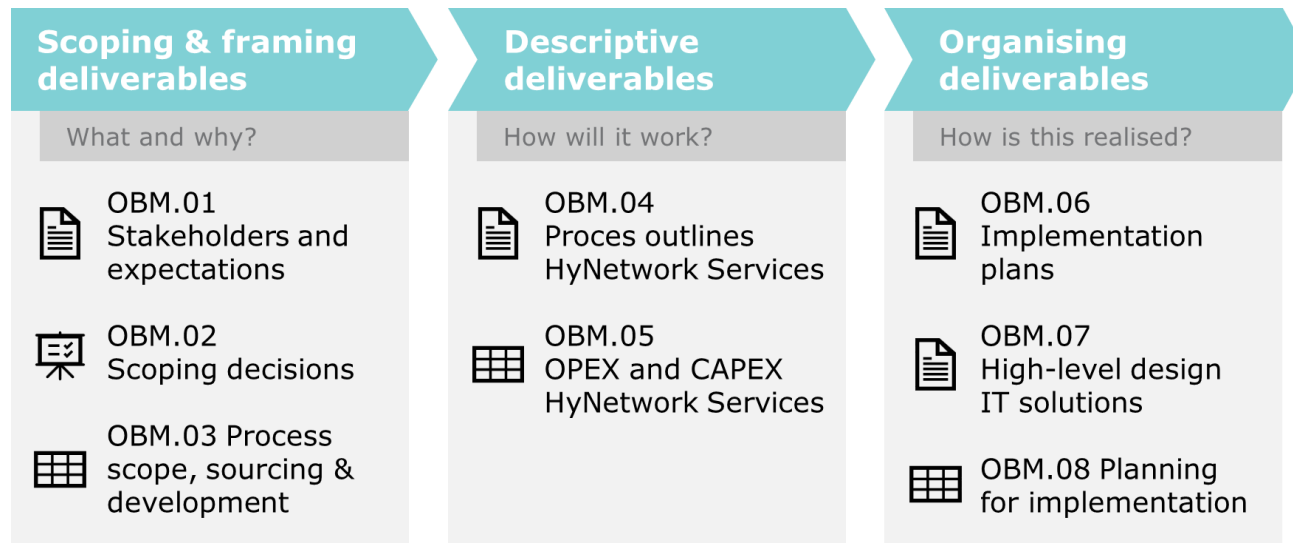
Operational principles for the hydrogen market

Presentation for ENTSOG & EASEE-gas



Gasunie has created a blueprint organisational model for hydrogen transport, that will be implemented for HyNetwork Services

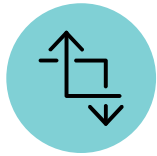
- The Operational Business Management workstream is preparing the existing Gasunie organisation for managing the Dutch hydrogen transport network.
- The blueprint describes the frameworks, business processes and IT systems required for the operation of the hydrogen backbone.



OBM.02 Scoping decisions



HyNetwork Services aims to meet contractual agreements and market expectations at the lowest cost.



There is a solution space with different options for meeting agreements and expectations.



In order to make cost-effective decisions within that space, we take scoping decisions



For each scoping decision, an overview is given of options, criteria and decisions with sound reasoning

OBM.02.01 Pipeline Flexibility Service

OBM.02.02 Balancing regime

OBM.02.03 Telemetry

OBM.02.05 Accountable metering

OBM.02.06 Integration of H₂ and natural gas in dispatching

OBM.02.07 Allocation

OBM.02.08 Information provision

OBM.02.09 Principles of phasing of business operations

OBM.02.11 Nomination

OBM.02.12 Unit for nominating, balancing, allocating

OBM.02.13 Application of OBAs

OBM.02.14 Certificates for green/blue hydrogen

OBM.02.18 Initial system pressure

OBM.02.19 Physical and administrative imbalance

OBM.02.20 Balancing time unit

OBM.02 Scoping decisions

- OBM.02.01 Pipeline Flexibility Service
- OBM.02.02 Balancing regime
- OBM.02.03 Telemetry
- OBM.02.05 Accountable metering
- OBM.02.06 Integration of H₂ and natural gas in dispatching
- OBM.02.07 Allocation
- OBM.02.08 Information provision
- OBM.02.09 Principles of phasing of business operations
- OBM.02.11 Nomination**
- OBM.02.12 Unit for nominating, balancing, allocating**
- OBM.02.13 Application of OBAs
- OBM.02.14 Certificates for green/blue hydrogen
- OBM.02.18 Initial system pressure
- OBM.02.19 Physical and administrative imbalance
- OBM.02.20 Balancing time unit

As part of the Nomination scoping decision, we considered the preferred timing of the hydrogen day

We considered the optimal unit for communication about quantities of hydrogen

What is the preferred timing of the hydrogen day?

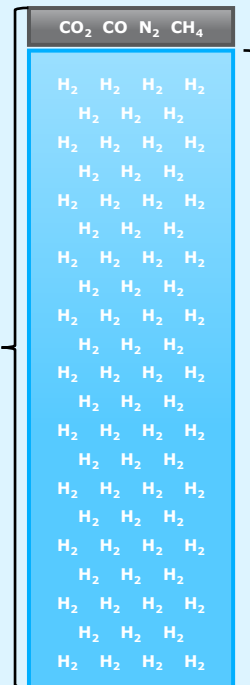
	Future proof	Preference of connected parties & shippers	Implementation effort for TSOs
0 – 24 h	<ul style="list-style-type: none"> Hydrogen will be tightly integrated with the electricity market on the long term. Therefore, it is more logical to match the standard for electricity (calendar day). Other 'new' carriers (CO₂ & heat) also implement the calendar day 	<ul style="list-style-type: none"> Industries in the hydrogen market are used to calendar days. Industries expect hydrogen to follow the electricity sector 	<ul style="list-style-type: none"> Adaptations needed in IT systems
6 – 6 h	<ul style="list-style-type: none"> Not compatible for the long-term energy markets 	<ul style="list-style-type: none"> Existing customers are used to working with gas days Not desired by industry active in hydrogen market 	<ul style="list-style-type: none"> Fits more easily into existing systems & ways of working

For contracting, nominating, balancing and allocating, the proposal is to choose **net kWh** as the basic unit

Gross or net unit?



A **gross unit** includes all by-products, which are considered undesirable by most customers.

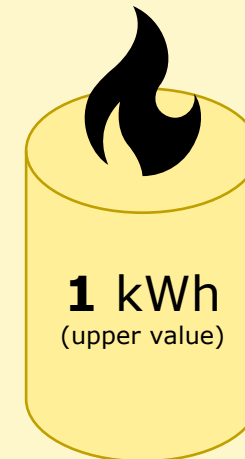
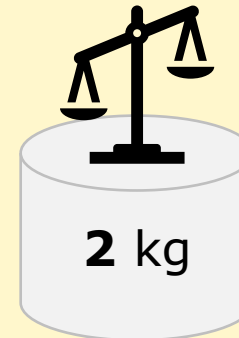


A **net unit** only takes the hydrogen particles with it, is an incentive for purer hydrogen, the product that customers demand, on which subsidies are based and on which certificates are issued.

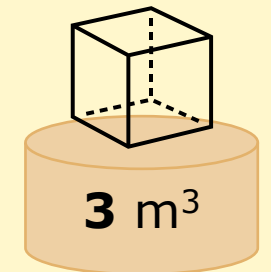
Energy, mass or volume?

Best unit for integration with the gas and electricity market and for Gasunie as an energy infrastructure company

Only logical for feedstock/chemical customers



No relevant unit for customers, depending on conditions



Edig@s, AS4 and current BRS's are suitable for the hydrogen market

- **Edig@s supports the hydrogen day**
 - The use of a definition of "gas day" is flexible in the Edig@s messages, as long as it is agreed upon in e.g. Nomination messages
 - Using "calendar day" is a legitimate period in the current standard for messages in Edig@s
 - So the BRS Nomination and Matching Procedures 4 In Gas Transmission Systems (NOM BRS) is applicable
- **Edig@s supports the kWh unit**
 - The unit kWh is supported in Edig@s
 - In this case the definition of a "net kWh" is important
 - Definition must be made on EU level, EASEE-gas CBP on Hydrogen
- **AS4 ensures safe messaging**
 - Since AS4 is message agnostic, the protocol can be used for hydrogen messaging
 - In the ENTSOG profile references to business processes are made in the header, investigation should be performed by EASEE-gas to check if changes are needed
 - In the last >15 years AS2 and AS4 proved to be a secure and reliable standard protocol

13. Round-up, Questions & Answers



Douglas Walker Hill
Interoperability & Data
Exchange
ENTSOG

DE session summary Q&A and future of CNOTs



– CNOTs Now

- Strong maintenance & Chg Mgmt structure (EASEE/ENTSOG/EC)
 - AS4/edig@s/BRS/Guides/Tools (eDel AS4,EASEE-connect, edi test portals)
- Strong adoption of CNOTS (NC helps) in gas sector (EASEE/ENTSOG/GIE)
- Strong support from the community for standard document exchange
- CNOTs being trialled in H2 – fit for purpose, so it seems!

– CNOTs Future

- More adoption of standard CNOTs throughout the whole gas chain
- More benefits for a broader gas cross-section i.e. CNOTS for H2 and beyond
- More legislation and regulation for new gases (encourage CNOT adoption)

Tomorrow's session: Cybersecurity session 09:00-14:00



Speaking slot	DAY 2. 18th October - CYBERSECURITY - Presentation topics	Presenter and affiliation	From	To
1	Introduction and welcome	Andrea Chittaro - Snam	09:00:00	09:05:00
2	Agenda	Douglas Hill - ENTSOG	09:05:00	09:10:00
3	Threats: ENISA Cybersecurity landscape threat assessment	Konstantinos Moulinos - ENISA	09:10:00	09:25:00
4	Threats: Evolution of Cybersecurity attacks - A TSO perspective	Lucrezia Tunesi - Snam	09:25:00	09:40:00
5	Threats: Threat mitigation - A CS hardware provider perspective	Balkentel Ltd	09:40:00	09:55:00
6	Legislation: NIS 2.0 updates	Alessandro Lazari - F24	09:55:00	10:10:00
	BREAK	20 Mins	10:10:00	10:30:00
7	International CS: A research perspective on future cybersecurity issues using AI and quantum computing	Dr. Alexandru Georgescu - ICI	10:30:00	10:45:00
8	International CS: ENTSOG ReCo Security of Supply	Anton Kolisnyk - ENTSOG	10:45:00	11:00:00
9	International CS: Downstream perspectives of an electricity EU EDSO and ENCS	Olivier Clement - ENEDIS Maarten Hoeve - ENCS	11:00:00	11:15:00
10	International CS: ENTSO-E. "ENTSO-E reflections on the challenges facing in the electricity sector."	Ivan Stefek - ENTSO-E	11:15:00	11:30:00
11	International CS: European Defence Agency. The value of CS Table top exercises in the energy sector	Brigadier General (retired) Ioannis Chatzalexandris	11:30:00	11:45:00
	LUNCH	1 hour	11:45:00	12:45:00
12	Awareness: Introduction to the ENISA awareness package	Dr. Alexandros Zacharis - ENISA Dr. Georgia Bafoutsou - ENISA	12:45:00	13:05:00
13	Awareness: Desktop exercises with ENISA	Dr. Alexandros Zacharis - ENISA Dr. Georgia Bafoutsou - ENISA	13:05:00	13:50:00
14	Thank you, questions and goodbye	Douglas Hill - ENTSOG	13:50:00	14:00:00



Thank you for your attention Tomorrow's Cybersecurity session starts at 09:00hrs

Douglas Walker Hill, Interoperability & Data Exchange Adviser

douglas.hill@entsog.eu

ENTSOG - European Network of Transmission System Operators for Gas

Avenue de Cortenbergh 100, 1000 Bruxelles

www.entsog.eu | info@entsog.eu

