



Regional Group NSI West

Project presentations

PCI 5.1.1 – Physical Reverse Flow at the Moffat Inconnection

The Moffat interconnection point is currently uni-directional, supporting forward flow only from UK to IE, the Isle of Man and Northern Ireland (onshore). Gas Networks Ireland recently completed feasibility studies under PCI 5.1.1 Physical Reverse Flow at the Moffat interconnection point which have been part funded by the CEF. The studies concluded in November 2018.

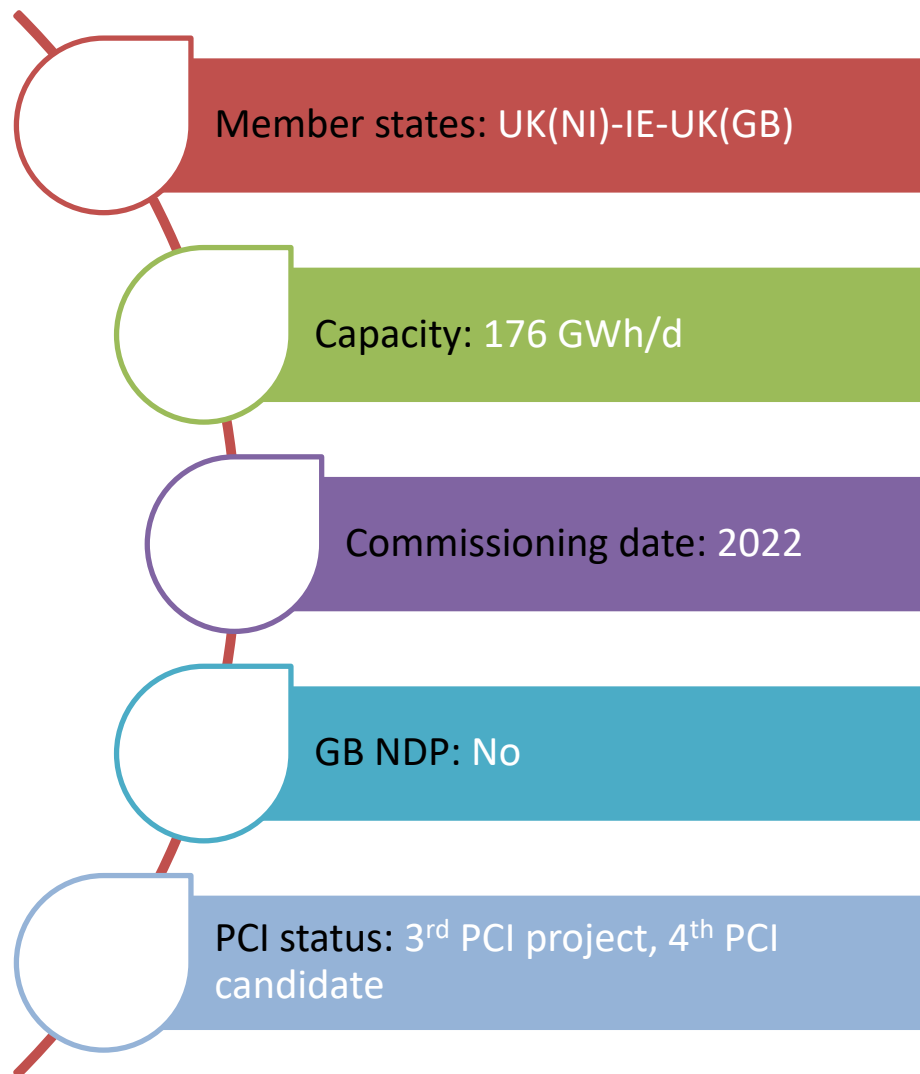


- The feasibility study identified the requirement for works on compressor stations and odorant facilities to allow for the physical reverse flow through GNI's gas interconnectors.
- The planned capacity is **139 GWh/d** at a cost of **€119m Capex** and **€3.3m/yr Opex**, **timeline** for construction is **2021**
- Current Status – GNI has fed results of the feasibility into the upcoming Market Consultation for Physical Reverse Flow at Moffat.
- PCI 5.1.1 acts as an enabler project to LNG and storage. PRF at Moffat increases the likelihood of these developments going ahead (as PRF at Moffat enables IE gas to supply the UK) and thus would further improve Ireland's Single Largest Infrastructure Disruption indicator and also increase Interconnection Diversification.



Co-financed by the European Union
Connecting Europe Facility





Project status

Less-advanced/advanced. Project at feasibility stage on GNI(UK) side

Benefits and costs

Ofgem have not performed any independent analysis on this project and are therefore unable to comment on its benefits and costs.

Ofgem does not object to the inclusion of this project in the 4th PCI list

Project Description: Upgrading existing line to allow physical reverse flow of gas between Ballylumford and Twynholm. Required to facilitate Islandmagee Gas Storage Project

1. UK Needs:

Single Largest Infrastructure Disruption
LNG & Interconnection Diversification

2. Benefits:

market integration through lifting isolation
and improved system flexibility / increasing
security of supply through appropriate
connections / supporting intermittent
renewable generation

Project is located on territory of one Member
State and has a significant cross-border
impact to ROI

Estimated Cap Ex Cost: c.€60m

Estimated Op Ex Cost: c.€1-2m p.a. (TBC)

3. Technical Details

installation of bi-directional compression on
Scotland to Northern Ireland Pipeline (SNIP)

- i) Pipework modification at 2 AGIs to allow bi-directional metering and flow control
- ii) Moving gas odourisation point to a new point(s) downstream of system
- iii) **Capacity Increment:** 131 GWh/d

Other related Connected Projects:
Islandmagee Gas Storage 5.1.3
Physical Reverse Flow at Moffat 5.1.1

4. Timeline

Project State and Commissioning Date:

The project is in the “*Consideration Phase*”.

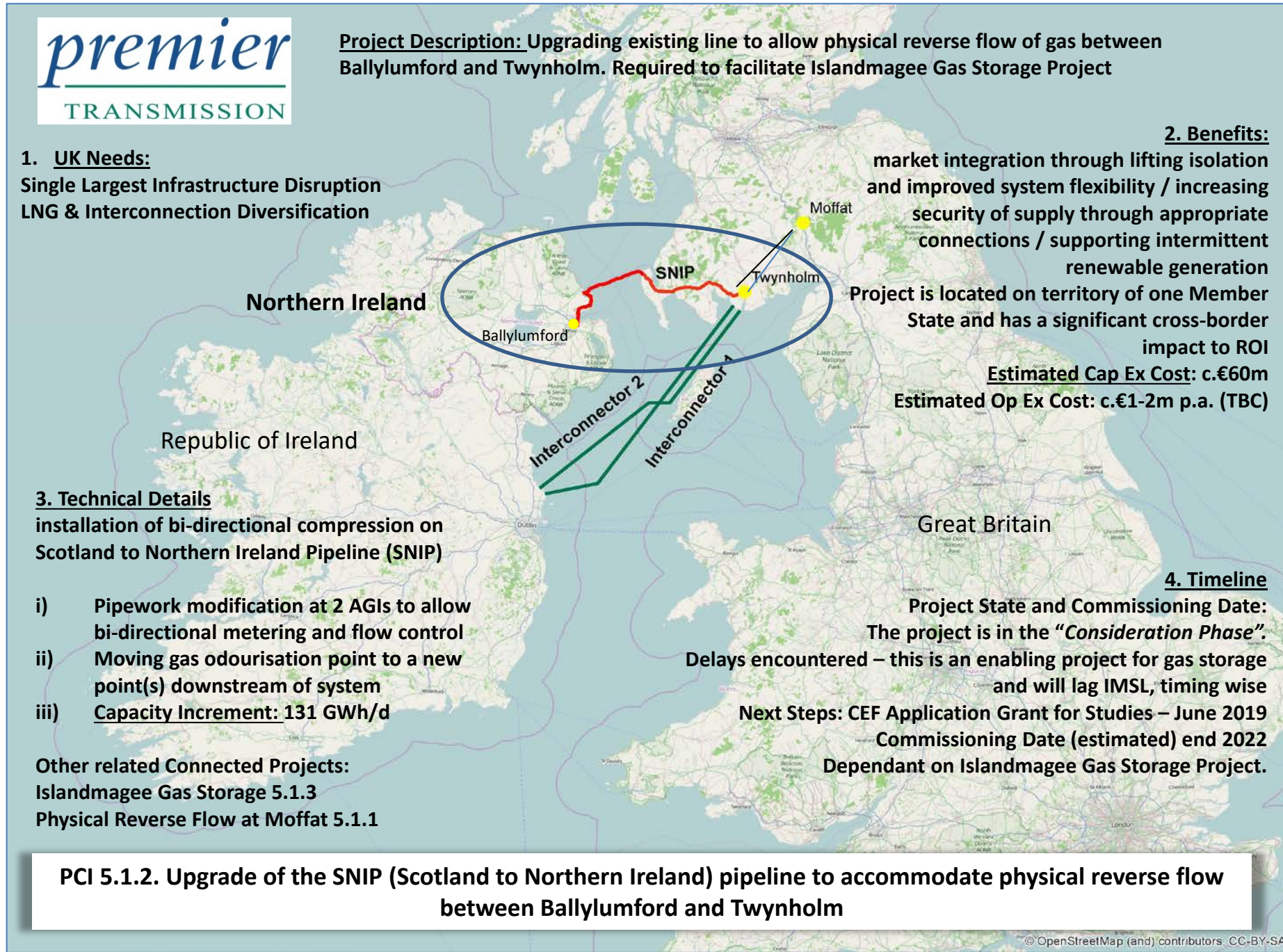
Delays encountered – this is an enabling project for gas storage
and will lag IMSL, timing wise

Next Steps: CEF Application Grant for Studies – June 2019

Commissioning Date (estimated) end 2022

Dependant on Islandmagee Gas Storage Project.

PCI 5.1.2. Upgrade of the SNIP (Scotland to Northern Ireland) pipeline to accommodate physical reverse flow between Ballylumford and Twynholm



Physical reverse flow from NI to GB and IE via SNIP (TRA-N-0027)

- **Overview:** Located in N. Ireland. Part of GSIWEST_01 group with potential to reverse flows from storage to Ireland and GB via Scotland to Northern Ireland Pipeline (SNIP).
- **NDP:** Referenced in NI Capacity Statement 2017/18-2026/27
- **Status:** Less-Advanced
- **Commissioning dates:** project promoter forecasts at 2021, however this is dependent on progress and FID status of UGS-N-0294
- **Review of Costs** – Not able to assess. NIAUR do not hold comparative data.
- **Review of Benefits** – NIAUR expect project group to contribute significantly to Market Integration, SoS, Sustainability and Competition within the region.

1. UK Needs:

Single Largest Infrastructure Disruption
LNG & Interconnection Diversification

2. Benefits:

Competition, Security of Supply, Sustainability – reduction in physical & geographical isolation/market integration through lifting isolation and improved system flexibility/increasing security of supply through appropriate connections/supporting intermittent renewable generation

3. Technical details:

PCI Promotor: Islandmagee Storage Limited (IMSL)
North / South Pipeline

PCI Status: Existing PCI Project 5.1.3. Successful on both 1st, 2nd & 3rd PCI Lists.

Project Description: Development of the Islandmagee Underground Gas Storage (UGS) at Larne, Northern Ireland

Project involves: Creation of up to 8 salt caverns, capable of storing up to 420 mcm of gas, is located on territory of one Member State and has a significant cross-border benefit to Ireland

Estimated Capex Cost from Grant for Studies FEED report: c.£276.9m (incl risk prov)

Estimated Opex Cost from Grant for Studies FEED report: c.£5m per yr

Capacity Increment: withdrawal capability 22 mcm/d and injection 12 mcm /d. Capable of multiple cycles (>2) per yr

IMSL 5.1.3. Development of the Islandmagee UGS at Larne (Northern Ireland) G135 – IMSL

4. Timeline:

Project State and Commissioning Date: The project is in the post “Permitting Phase” post “FEED report” stage.

Commissioning Date – phased facility part operational by 04/2022.
Category of Gas Infrastructure: Underground Storage Facility (UGS)

Assessment Criteria: (Art.4 of TEN-E Reg.) Project is necessary for NSI West Gas Corridor

Moffat

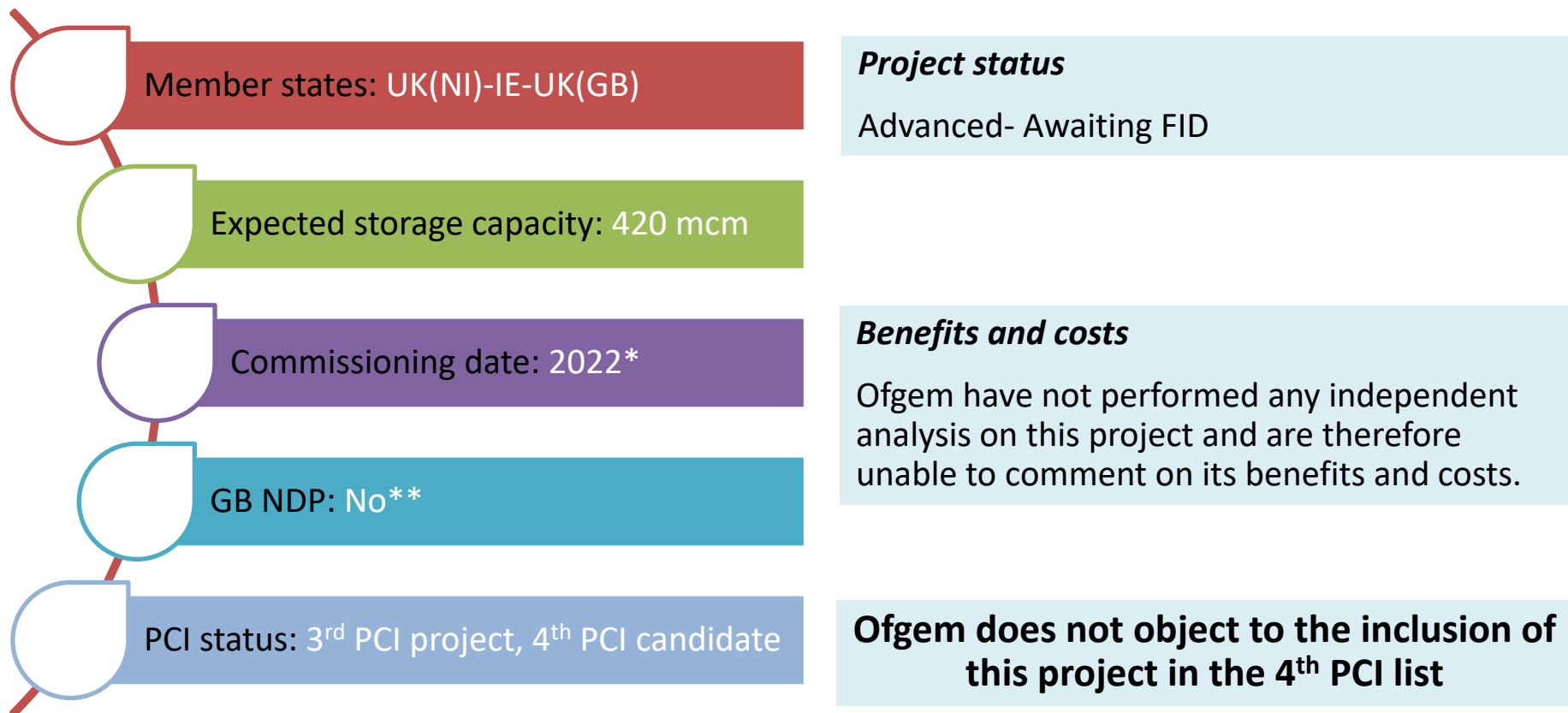
SNIP

IC1

IC2

Islandmagee Gas Storage Facility (UGS-N-0294)

- **Overview:** Located in N. Ireland. Part of GSIWEST_01 group with potential to reverse flows from storage to Ireland and GB. Total Capacity 420 mcm, Injection 12 cmc/d, Withdrawal 22 mcm/d when fully constructed.
- **NDP:** Referenced in NI Capacity Statement 2017/18-2026/27 and modelled in previous capacity statements.
- **Status:** FEED stage completed December 2018. Progressing FID 2019.
- **Commissioning dates:** Project split into phases with Phase 1 (2 caverns) forecast for 2020. Incremental increase of capacity through Phase 2. NIAUR not able to fully assess as dates are dependent upon FID.
- **Review of Costs** - Capex and Opex costs for Phase 1 in line with information NIAUR received from the project promoter. NIAUR do not hold comparative data for Phase 2 Capex and Opex costs.
- **Review of Benefits** – NIAUR expect project group to contribute significantly to Market Integration, SoS, Sustainability and Competition within the region.



* The Islandmagee gas storage project is a commercial project and the commissioning date is dependent upon a Final Investment Decision (FID) by the project promoter. Without an FID, Ofgem are reluctant to provide a firm opinion on the proposed commissioning dates.

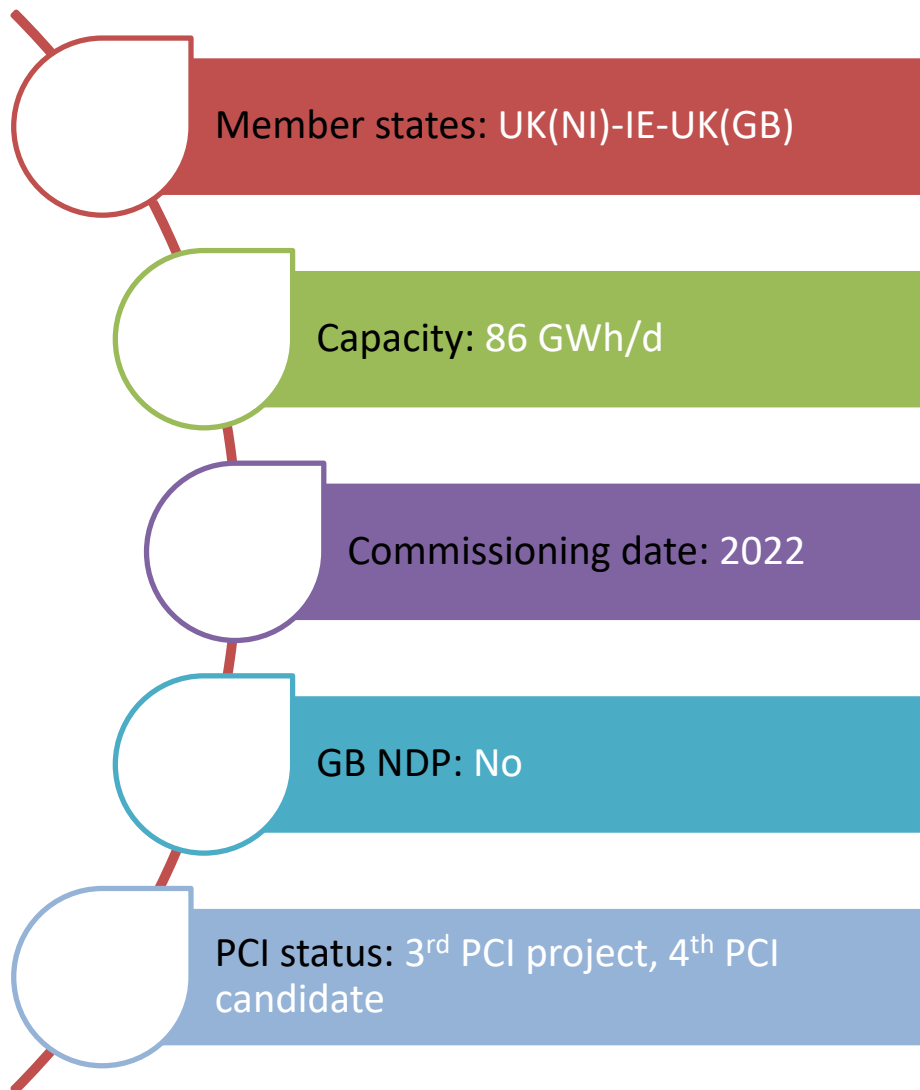
** Islandmagee is mentioned as proposed project in the [2018 GTYS](#) (part of the UK(GB) NDP). This document does not assess the viability of current and future projects, and does not provide project specific information. Therefore inclusion in the UK(GB) NDP should not be a barrier to inclusion as a PCI candidate.

Connecting Europe

Shannon LNG – Import Terminal (& HE CHP Plant)



- Description: LNG Re-gasification Terminal (& High Efficiency CHP Plant);
- Capacity Increment: Capacity increment (y1) of 86 GWh/d (2.8 bcm/y);
- Information and Commissioning Date: Project permitted – projected commissioning in 2022 (subject to outcome of planning approval judicial review);
- Gas infrastructure category: NSI West Gas Corridor;
- Project Necessity & Cross border Impact: Security of supply (N-1 standard), diversity of supply and market integration in Ireland. Significant cross border impact on markets in Northern Ireland and Britain.



Project status

Advanced

Benefits and costs

Ofgem have not performed any independent analysis on this project and are therefore unable to comment on its benefits and costs.

Ofgem does not object to the inclusion of this project in the 4th PCI list

PCI 5.4. - 3rd Interconnection point between Portugal and Spain



DESCRIPTION:

The PCI project is part of the Priority corridor NSI West Gas, and will connect PT and ES with a pipeline of **248 km** in the first phase. The second phase includes additional pipelines with a total length of **692 km** and reinforcements on the internal networks of each country (in the CS of Zamora (ES) and a new CS in Cantanhede (PT)).

CAPEX and OPEX (1st phase): 190 M€ and 3,2 M€/y

CAPEX and OPEX (2nd phase): 581 M€ and 10,3 M€/y

Promoters: REN and Enagas

Stage	Infrastructures		Technical Data			Capacity ES -> PT (GWh/d)	Capacity PT -> ES (GWh/d)	Status	Commissioning Date	Iberian Peninsula ¹
			km	mm	MW					
1	a)	PT: Celorico - Spanish Border Pipeline	162	700	-	70	70	Permitting (new route under study)	2025	STEP
	b)	ES: Zamora- Portuguese Border Pipeline	86	700	-			Pre-feasibility study done		
	c)	ES: CS Zamora	-	-	4			Pre-feasibility study done		
2	d)	PT: CS Cantanhede	-	-	12	139 (70 ² +69)	126 (70 ² +56)	Planned, but not yet in permitting	2028	FULL MIDCAT
	e)	PT: Cantanhede – Mangualde Pipeline	67	500	-			Planned, but not yet in permitting		
	f)	SP: Guitiriz-Zamora-Adradas Pipeline	307 148 170	800 750 600	-			Pre-feasibility study done		

According with TYNDP 2018 assessment and the problems detected for the NSI West gas, this PCI will enable:

- ✓ **SOS:** Meeting the N-1 for PT; increases the remaining flexibility (PT); and the potential demand curtailment of PT is halved (and slightly mitigated for SP)
- ✓ **Competition:** improves diversification of entry points (LICD for PT); reduces the dependence from LNG (PT); Reduce the existing differences in wholesale gas prices (PT); Access to other supply sources (PT with STEP or Full MidCat)
- ✓ **Market integration:** bi-directionality is improved
- ✓ **Sustainability³:** Supports coal to gas switching and RES integration, aiming EU decarbonisation goals

¹ According to the Madrid Declaration of March 2015 and Lisbon Declaration of July 2018.

² Capacity created in the first phase

³ From Project Fiche West 04 and West 05

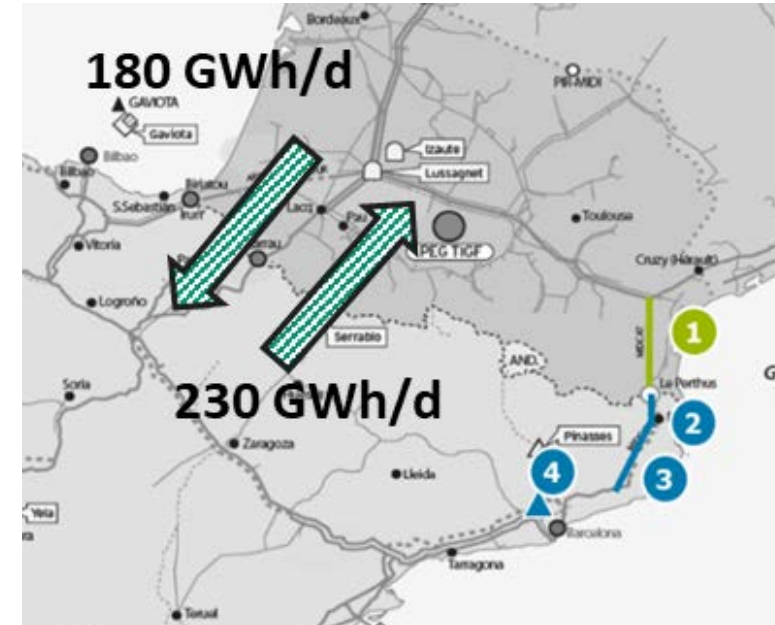
STEP Project

- Transmission pipeline: interconnection between French and Spanish networks on the eastern Pyrenees
- Advanced project as per TYNDP 2018
- Non-firm capacity up to 230 GWh/d from South to North, and 180 GWh/d from North to South (110 GWh/d firm entry capacity and 120 GWh/d firm exit capacity on Spanish side)
- INEA granted CEF-Funds to the following studies:
 - Engineering (2016, Spain)
 - Permit granting (2018-19, Spain)
 - Conceptual and FEED (2016-19, France)
- Engineering studies (INEA granted) performed in 2016
- Commissioning date : 2022
- Necessary to the development of the NSI west gas corridor.
- STEP aims at contributing to achieve the pillars of the internal energy market: sustainability, security of supply, competition and market integration.



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TSO	No.	Pipeline / compressor station	Length /Power	Ø	CAPEX
Teréga	1	Barbaira – Border	120 km	900 mm	290 M€
Enagás	2	Figueras – Border	28 km	900 mm	152 M€
	3	Hostalrich Figueras	79 km	900 mm	
	4	Martorell CS	36 MW		

SOUTH TRANSIT EAST PYRENEES (STEP) – WEST_06

- Project included in the French NDP
- Main project features:
 - Commissioning date: 2022 (not realistic in our opinion)
 - Capacity increase: no firm capacity increase on the French side
- Review of costs: no comment, ENTSOG's estimates are realistic
- Review of benefits:
 - The project has not been modelled by ENTSOG, which confirms the value cannot be calculated using the usual CBA methodology
 - With its current characteristics, the benefits of the project cannot be considered credible
- Overall position:
 - The project's cost-benefit analysis (largely built on results provided to the NRAs by an independent consultant) does not clearly show that its benefits outweigh its costs in the most credible scenarios
 - CRE objects to the inclusion of the project in the 4th PCI list

PCI 5.19 MELITA TRANSGAS PIPELINE

CONNECTING MALTA TO THE EUROPEAN GAS NETWORK



List of regional needs **GAS RG NSI WEST** identified the “**physical isolation**” as the main need for **MALTA**.

MTG Pipeline will put an end to Malta’s isolation from the European gas network and contribute to the integration of the internal energy market. Main benefits:

- enable gasification of the island and replace the importation of LNG through shipping;
- guarantee greater security of energy supply to the island;
- complement the EU’s strategy towards the diversification of sources/import routes;
- enable access to lower cost of natural gas sources thereby improving competitiveness and affordability;
- contribute to sustainability through reduction of GHG emissions from LNG supply chain whilst generating environmental landscape benefits.

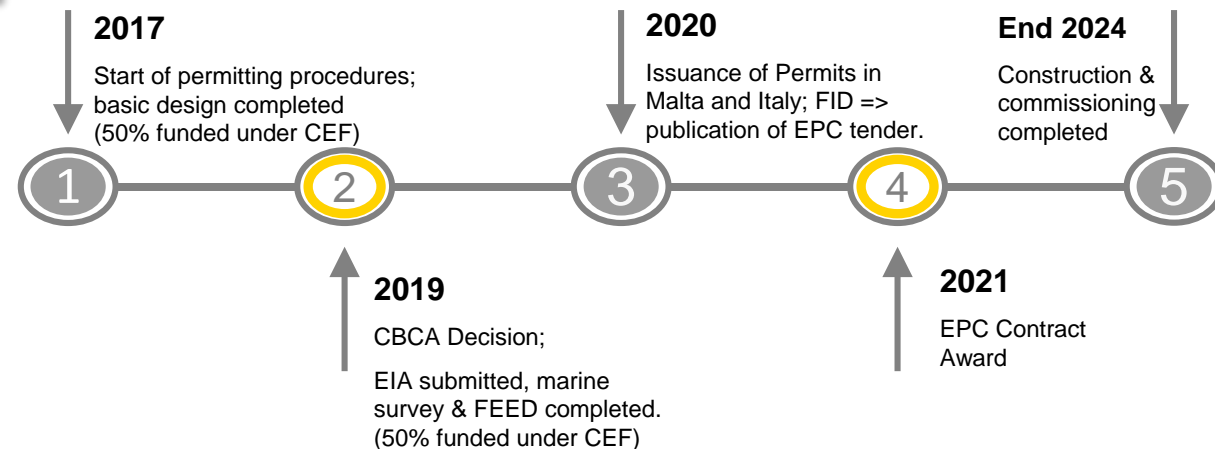
PCI 5.19 selected in 1st, 2nd & 3rd PCI lists

Project Promoter: Melita TransGas Co. Ltd

CAPEX: €342 million*

OPEX: €2 million/year*

** Costs reflect Feb’18 project submission for TYNDP 2018*



PCI 5.21 L/H conversion project in Belgium and in France

FLUXYS

GRTgaz

Needs: The decline of the European gas production makes new imports necessary and requires connecting and converting the L-gas system to the H-gas.

Projects in Belgium and France are answering the need: **“Adaptation to High Calorific gas” in the NSI West Corridor.**

Objectives: to adapt the transmission network and storage facility:

- to convert L-gas customer to H-gas as scheduled in coordination with DSO, industrial customers and neighbouring countries;
- to avoid any gas curtailment in the L-gas areas;
- to transport new H-gas supplies to newly converted H-gas consumers, so they can benefit from the same competitive and secured supply as H-gas consumers.

Benefits:

- Security of Supply: complete mitigation of L-gas demand curtailment in case of disruption of L-gas supplies (~4 Md€/y monetization)
- SLID: removing demand curtailment in case of disruption of the largest L-gas infrastructure (~100 M€/y monetization)

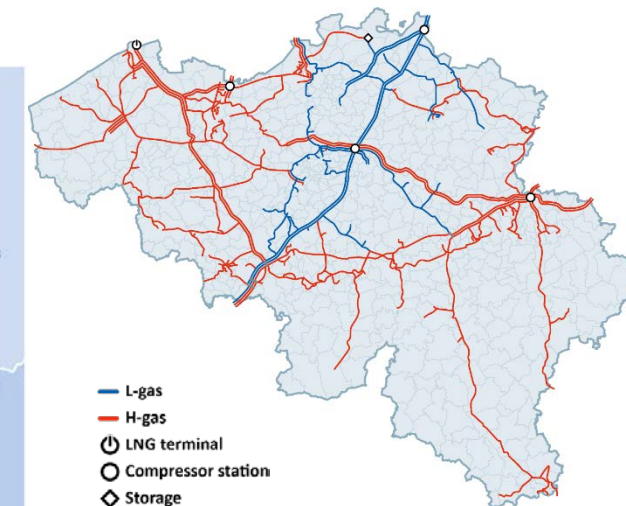
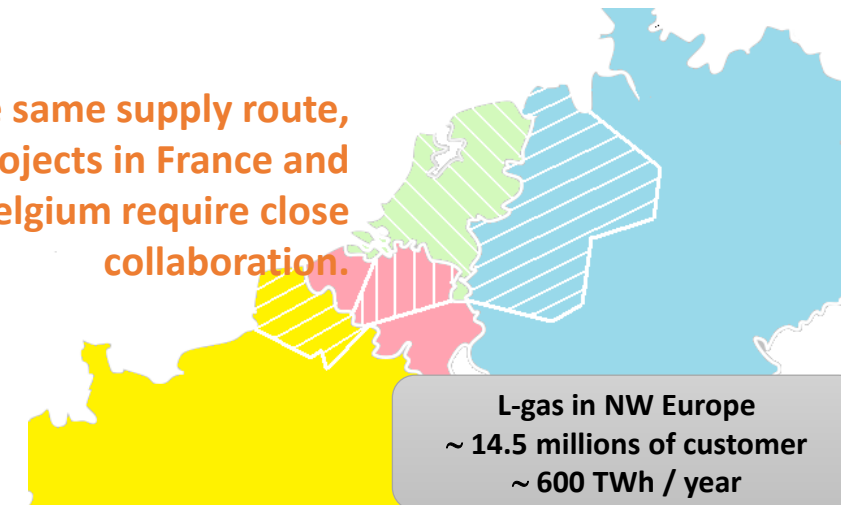
Costs:

180 M€ CAPEX

Planning:

2016 - 2029

On the same supply route,
conversion projects in France and
Belgium require close
collaboration.

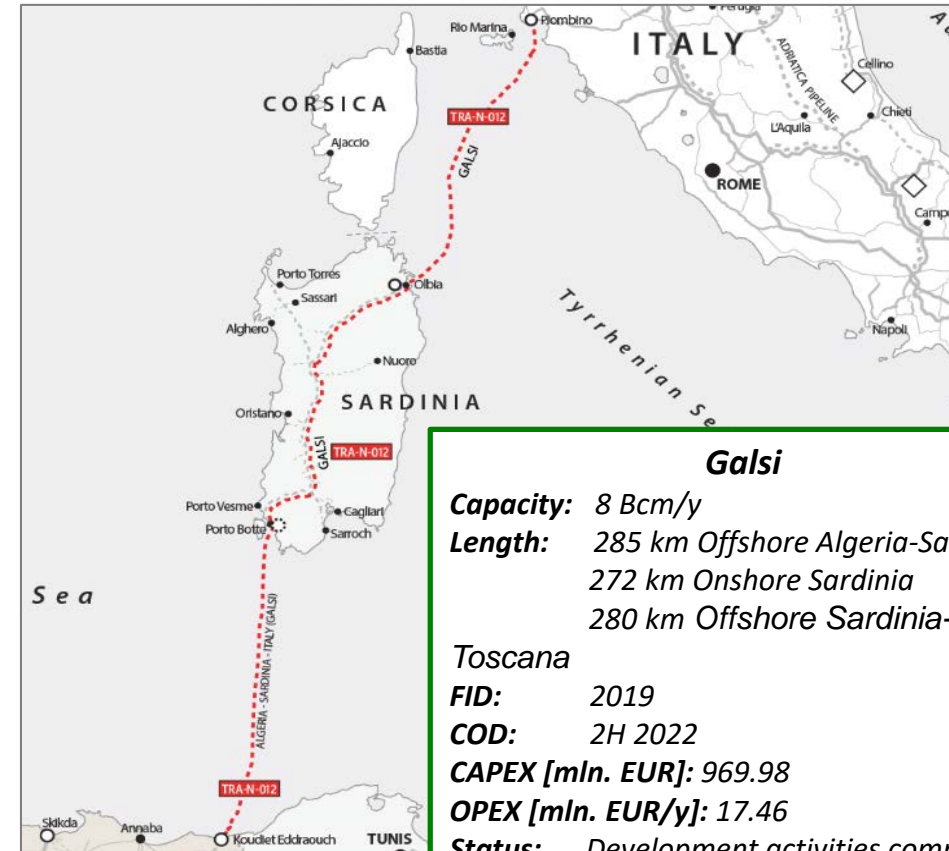


CONVERSION PROJECT L-GAS TO H-GAS – WEST_09

- WEST_09: project Belgian network (TRA-N-500) & French network (TRA-N-429)
- PCI in 3rd list (2017)
- Joint CBCA decision by CREG and CRE (2018)
- Main project features:
 - Market transition from L-gas to H-gas due to phase-out L-gas exports decided by NL
 - Commissioning date: TRA-N-500 in 2022 and TRA-N-429 in 2025
 - Investments in Belgium secure necessary transport of L-gas from NL to France during transition
 - Capacity increase: aims at maintaining the current capacity
- Review of costs: no comment, ENTSOG's estimates are realistic
- Review of benefits:
 - Value of Lost Load of 600€/MWh might lead to an overestimation of the benefits
 - However, the benefits that can reasonably be expected largely outweigh the cost of investment
- Overall position CREG and CRE:
 - This project is of major importance for the region NWE and for the integration of the EU gas market in general (move to one quality gas)
 - CREG and CRE support the inclusion of the project in the 4th PCI list

Galsi Project

- Galsi project addresses the following main needs:
 - **Ends of isolation:** enable the gasification of Sardinia and provide direct access to mainland Europe via Italy
 - **Security of Supply:** increasing the remaining flexibility of Sardinia island. In Italy, the project increases the Remaining Flexibility by 1% in the scenarios with higher demand on peak day
 - **Competition:** provide a strategic diversification of gas supply routes to European markets and their supply flexibility.
 - **Market Integration:** contribute to the creation of an Italian gas hub and increase the liquidity enabling the export of major gas volumes from Italy to other European markets



Gas pipeline project offers additional benefits:

- Sustainability:
 - ✓ enhance the gasification of Sardinia island in Italy and remove the area from isolation;
 - ✓ reduction of CO2 emission costs due to the switching from coal to natural gas in the power sector;
 - ✓ reduction of fuel costs and of CO2 emission costs due to the switching from heating oil to natural gas
- Security of Supply: improve security of supply in Italy and Europe, providing for a new and more efficient route for Algerian gas



NSI WEST_012

Projects on the Italian territory: GALSI

Link between Algeria and Italy via Sardinia transporting 8 bcm of gas from El Kala (Koudiet Draouche) in DZ to Porto Botte in Sardinia; and from Sardinia (Olbia) offshore section to Piombino

- Length: 288 Km. E/E capacity: 258 GWh/d
- Sponsors: Sonatrach (47%), Edison (23%), Enel (17%), Hera (11%)
- Presence in NDP: YES
- Commissioning date 2019. FID: NO
- CAPEX: 970 M€ (compared to an estimate of 3,495 M€ made by the project promoter in 2015). OPEX: 17 M€/y

Monetised benefits (Low-global climate): 122 M€/y (CO2 savings) + 75 M€/y (fuel switch)

ARERA position: **OPPOSING ITS POSSIBLE INCLUSION IN THE PCI LIST.** Inconsistencies in expected costs, not realistic commissioning date, partial overlap with existing projects (Sardinia methanization).