



## Overview of flexibility instruments

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Flexibility instruments	Type of flexibility (ST, MT, LT) <sup>1</sup>	Development of market competition		Security of Supply	Regulated or not?
		Accessibility	Transparency		
Cavern storage	ST/MT	Third party access guaranteed through Gas Directive 2003/55/EC and GGPSSO (TPA does not apply for those part of the facilities needed for production activities and/or operations of transmission network operators). Exemptions under Article 22 possible for new/expanded facilities.	Transparency ensured through GGPSSO. Valid for regulated TPA as well as negotiated TPA regimes	Overall EU Storage capacity can provide for nearly 16% of EU gas consumption, cavern contribution limited to ST/MT. Storage can be used by neighbouring countries where sufficient interconnection opportunities exist.	EU member states can choose between negotiated and regulated TPA.
LNG peak shaver	ST	<i>See Cavern.</i>	<i>See Cavern.</i>	<i>See Cavern</i> , contribution to ST security of supply.	<i>See Cavern</i>
LNG facility for importation and re-gasification of LNG	ST-MT-LT	Third party access guaranteed through Gas Directive 2003/55/EC. Exemptions ex Article 22 possible for new/expanded facilities, various exemptions granted to date	Transparency ensured through voluntary commitment to GGPLNG	Subject to competition for LNG supplies.	Regulated TPA, various exemptions from TPA.
Depleted field storage	MT/LT	<i>See Cavern</i> , no exemption granted to date.	<i>See Cavern.</i>	<i>See Cavern</i> , contribution to LT security of supply.	<i>See Cavern</i>
Aquifer storage	MT/LT	<i>See Cavern</i> , no exemption granted to date.	<i>See Cavern.</i>	<i>See Cavern</i> , contribution to LT security of supply.	<i>See Cavern</i>
Production swing	ST-MT-LT	No specific EU requirements.	No specific EU requirements.	Significant but declining contribution to security of supply in the EU, as domestic production is decreasing. Regional role of this flexibility	Falls under National upstream licensing regimes and contractual arrangements

<sup>1</sup> Type of flexibility: Flexibility services are delivered within (i) ST = short term duration, (ii) MT = mid term duration or (iii) LT = long term duration

				instrument, which can be used by neighbouring countries.	
Dual fire	ST	No European regulation on access or conditions. Dual firing stimulates competition by making different fuels competing in the same market.	No specific EU requirements	Dual firing enhances security of supply policies through flexibility offered in the fuel-mix for energy generation.	Non-regulated flexibility instrument
Line-pack	ST	Inherent capability in the pipelines. Access to line-pack depends on the design on the transmission grid and the related balancing regime.		Line-pack contributes to security of supply through offering flexibility in existing infrastructure.	Part of the TSO service.
Quality conversion	ST/MT	No European regulation on access or conditions. In national framework (NL & UK) discussion about the socialisation of conversion costs.		Quality Conversion contributes to security of supply, by enabling access to markets of different qualities of gas thus increasing overall supply.	No European regulatory framework. National legislation and regulation.
Cross border flexibility through gas pipeline interconnection within the EU	MT/LT	Third party access guaranteed through Gas Directive 2003/55/EC Exemptions possible for new/expanded interconnections. Some exemptions granted/pending		Cross border interconnections are of key importance for security of gas supply (Aspect of capacity increase)	TPA, unless exempted.
Import flexibility through import pipelines from outside EU	MT/LT	No European regulation on access conditions for import pipelines outside territory of EU Member States.		OECD Europe has import capacity of roughly 50% more than its yearly consumption. This flexibility is of considerable value in allowing suppliers to respond to variations in demand, or even shortfalls from another supplier. (Aspect of supply diversity)	No European regulatory framework for tariffs, transparent and non-discriminatory access to import pipelines outside the EU.
Flexibility within supply contracts  (Inside/outside territory of EU)	ST-MT-LT	EU gas consumers have freedom to choose their preferred supplier/supply conditions.		Traditionally a large share of European supply contracts have contained a substantial amount of flexibility allowing buyers a certain variation in their daily, monthly and yearly off- take. But as European gas production declines, this flexibility will increasingly have to come from outside EU.	No European regulatory framework existent
Interruptible contracts	ST	Limited to industry, power generators and others with fuel-switching capabilities or willing to take a risk	Some transparency within border but not necessarily across border/different TSOs	No direct impact on security of supply but interruptible contracts help manage demand in case of exceptional weather conditions or supply shortage.	Some end-user demand protected by regulation
Spot and futures markets	ST/MT	Low development: Bilateral trade/ difficult to find counterpart High development: High liquidity/easy access	The better developed trading markets are, the more transparency is ensured.	Cross border trade can alleviate supply deficit in specific region (need infrastructure)	No
Swaps	ST-MT-LT	Low development: Bilateral agreement/ difficult to find counterpart High development: High liquidity/easier access	The better developed trading markets are, the more transparency is ensured.	Shortening delivery routes or bridge differences in demand patterns between different regions	No

Flexibility instruments	User group of provided Flexibility	Differences within EU In what respect? Regulation? (Yes/No)	Changes over time Regulatory development in the last years? In what respect?	Effectiveness of regulation
Cavern storage	Suppliers, producers, TSOs, municipal utilities, energy traders	Yes	Market liberalisation: More arbitrage and hedging so storage is not only a matter of volume but also price optimisation. Also more competition among storage facilities in different countries. Regulatory development: GGPSSO published in 2005 and implemented by SSOs on voluntary basis with high level of compliance (see: GSE assessment of GGPSSO implementation). GGPSSO will become binding under the Third Energy Package.	Market liberalisation increasingly ensures TPA instead of regulation. More need to ensure cross border trade
LNG peak shaver	Suppliers, producers, TSOs, municipal utilities, energy traders	Yes	See "cavern"	See "cavern"
LNG facility for importation and re-gasification of LNG	Suppliers, producers, municipal utilities, energy traders	Yes	See "cavern". Even more pronounced due to global market liberalisation	See "cavern"
Depleted field storage	Suppliers, producers, TSOs, municipal utilities, Energy traders	Yes	See "cavern"	See "cavern"
Aquifer storage	Suppliers, producers, TSOs, municipal utilities, Energy traders	Yes	See "cavern"	See "cavern"
Production swing	Suppliers, producers, TSOs, municipal utilities, Energy traders	Yes, different upstream licensing regimes	Not applicable	Not applicable
Dual fire	Energy utilities, industrial customers	Yes, for degree of usage, possibly for national legislation. No for European framework on emissions etc.	Given the high volatility in energy prices, dual firing has become an interesting option to switch between fuels quickly and to profit from cheaper prices for alternative fuels	Not regulated, would not be effective, given the fact that the availability of the fuels is the limiting factor, which can only be taken away by a liquid fuel market.
Line-pack	TSOs and gas shippers using the TSO system, depending on the balancing regime in place.	The use of line-pack differs strongly among countries, according to the design of the transmission grid and supply patterns. In the UK line-pack traditionally covered up to 3% of total demand. In Spain, the figure is 0,4%. In some circumstances, extra compression or a larger pipe may be a useful alternative to storage by increasing the potential for line-pack. <sup>2</sup>	See "cavern"	The use of line-pack depends on the design of the transmission system and the related balancing regime.
Quality conversion	Contracted by suppliers or industries directly connected to the grid.	Different regimes in different countries. quality conversion is not offered in all countries.	No European developments	-

<sup>2</sup> IEA, Flexibility in Natural Gas Supply and Demand 2002

Cross border flexibility through gas pipeline interconnection within the EU)	Energy companies that have import contracts with producers (often long-term "take-or-pay" clauses)	Yes, as stipulated in the contract	Market liberalisation: More gas to gas trade, especially cross border, will give better valuation of storage and more competition among storages	Inconsistent and changing regulatory regimes across member states are a major barrier to cross-border infrastructure investments to net EU gas markets
Import flexibility through import pipelines from outside territory of EU	Market players in general , in particular traders and suppliers that have import contracts with producers (often long-term "take-or-pay" clauses)	Yes, as stipulated in the contract	With rising gas imports from outside the EU storage sites will become even more important to meet the flexibility requirements	Changing EU energy policy may affect import infrastructure investments linked to new supply routes which would meet the goals of enhanced security of supply and increased market competition.
Flexibility within contracts on gas supplies inside the EU	Market players in general	Yes, as stipulated in the contract	If more and more flexibility instruments (e.g. storage sites) become available the demand for, often expensive, traditional contract flexibility will decrease	N/A
Flexibility within contracts on supplies from outside territory of EU	Suppliers that have supply contracts with producers from Non-EU Member States	Yes, as stipulated in the contract	<i>See above</i>	N/A
Interruptible contracts	Market players/end users with fuel alternative or willing to take a risk	Yes, depends on fuel alternative or responsiveness to price changes	If more gas to gas trade the demand for interruptibles can become more market driven	Market liberalisation: Interruptible contracts will be in more direct competition to storage
Spot markets	Market players in general	Yes, some markets more developed than others. Still lack of cross border trade in EU	Market liberalisation: More gas to gas trade, especially cross border, will give better valuation of storage and more competition among storages. Storage sites actively contribute to market liquidity.	Market liberalisation: Better and more transparent valuation of storage mean better use of storage. Futures contracts more direct competitor to storage
Swaps	Market players in general	Yes, depends on ability to find counterpart	Market liberalisation: Balance surplus and deficit areas and reduce transportation costs. Storage sites actively contribute to market liquidity	Market liberalisation: Swaps more direct competitor to storage