One-pager: Possible total life cycle savings for DC42/DC42+

Direct expected project saving related to redispatch costs.

In their analysis of May 2026, Frontier Economics finds a total lifetime extra cost of a factor 2.1 for constructing DC42/DC42+ with underground cables (UGC) compared to overhead lines (OHL). Frontier Economics uses conservative estimates for the annual amount of electricity having to be redispatched (2.15 TWh) for each year of 4-7 years delay of DC42/DC42+ in case of a change from UGC to OHL. However, Frontier Economics estimate that the affiliated annual redispatch costs is 179-190 Mio. EUR. In the case of the latest expected non-realisation of DC40 and DC41 (Netzentwicklungsplan 2025), Frontier Economics estimates annual redispatch costs of approximately 400 Mio. EUR, which reduces the cost factor to 1.9[1]. Not included are costs related to higher sabotage risks for OHL. Socio-economic damage costs caused by increasing sabotage events are difficult to quantify but should also be included in the cost considerations.

Additional direct potentialDC42/42+ savings

In addition to a redispatch-related cost reduction, further potential savings related to technological development could be obtained, as explained in depth in the annex and summarized in this one-pager. All potential savings relate to Frontier Economics estimates for cable system (material) costs of 4.7-5.6 Bn EUR and construction costs of 2.5-4.5 Bn EUR.

Measure: three different technology choices offered by NKT. Each case is separate, and estimated savings cannot be summed up.	**Potential savings on cable system (Mio. EUR)**
Case 1: 90°C (instead of 70°C) Copper Conductors (525 kV system)	470-840 (10-15%)
Case 2: Includes 90°C as in Case 1 + Aluminium (not Copper) conductors (525 kV system). NKT is very confident to deliver this technology well before 2035	1,410-1,680 (30%)

1. On top of each case, the choice of 90°C cable technology can support a more compact underground cable installation. For the same current-carrying requirement, the higher permissible conductor temperature can reduce the required cable spacing and bedding dimensions by roughly 25 %. (spacing around 0.5 meters). This reduces TSO's construction costs, which constitute a large share of the total UGC-cost.

2. Further cost savings related to improved civil works, clever permitting, a better repair concept, and reduced financial security fees could be obtained.

Socio-economic savings for Germany

Frontier Economics estimates that for each year of 4-7 years of expected delay of DC42/42+ due to the change to OHL, at least 2.15 TWh (up to 4.5 TWh if DC40 and DC41 as expected are not realised by 2044). For each year of delay, such an amount of electricity (0.4-0.9 % of German electricity consumption) will not be fed into the German power system and would lead to socio-economic disadvantages for Germany in terms of:

a) higher electricity prices for both industry and private consumption due to less RE-electricity
b) 2.15-4.5 TWh gas-generated electricity would require imports for 250-500 Mio. EUR (0.5-1 Bn. cubic meters of gas, which leads to estimated 1-2 Mio. tons CO2-emissions when burned)
c) To fulfil climate targets, Germany would have to reduce CO2 emissions by an estimated 1-2 Mio. tons annually – very likely in sectors with a higher CO2-reduction cost than in the ETS1-sector. In addition, higher natural gas consumption implies the need for ETS1-credits at current prices of 75 EUR/ton.

Conclusion: The combined potential direct and socio-economic savings will reduce the additional cost for constructing DC42/DC42+ as UGC significantly below factor 1.9. These potential savings should be estimated by independent economists, and additional socio-economic savings would have to be further quantified by German authorities (e.g., BNetzA).

[1] „Um diesen Effekt zu erfassen, wird in der Sensitivitätsanalyse davon ausgegangen, dass die eingesparten Kosten für Engpassmanagement um einen Faktor 2 höher ausfallen (also ca. 400 Mio. EUR/a statt 200 Mio. EUR/a für die geschätzten 4-7 Jahre Verzögerung). Dies führt zu einer Reduktion des Mehrkostenfaktors auf ca. 1.9x." (Frontier Economics, Kostenanalyse zur Bewertung von Erdkabel und Freileitung, Mai 2026, p.44).

Annex 1. In-depth explanations for possible savings and socio-economic advantages

Possible savings directly linked to the construction of DC42/42+

Measure	Description	Estimated savings (range)
Cable Technology		
Case 1: 90 degrees Copper Conductors (525kV)	Increasing the operating temperature from 70°C to 90°C is a recent innovation from NKT. It allows the same current-carrying capability to be achieved with a smaller conductor cross-section, reducing metal content and therefore cable material cost.	Savings potentially up to 10-15 % on the cable system
Case 2 (alternative to case 1): Aluminium instead of Copper conductors (525kV)	NKT-innovation will enable the use of a different material, Aluminium, as a conductor for our cables, operating at 90°C while still transmitting the same amount of electricity. NKT already performed a number of tests that have proven that the respective mechanical and electrical requirements are met.	Savings potentially up to 30 % on the cable system
Other savings		
Improved civil works	1. New technologies (e.g., trenching and Horizontal-Directional-Drilling). 2. Create synergies with other infrastructure projects, i.e., using civil works for district heating or hydrogen pipelines for underground cables as well. 3. Ensure civil works are procured in scale and not short projects (as is currently done for SüdOstLink). 4. In addition, NKT's 90°C cable technology can support a more compact underground cable installation. For the same current-carrying requirement, the higher permissible conductor temperature can reduce the required cable spacing and bedding dimensions by roughly 25 %. (spacing around 0.5 m) 5. Install conduits for all cables to be installed as standard to allow fast repair, replacement, and removal (decommissioning); related cost is rather negligible.	Unclear, since this is outside of NKT's scope. However, according to Frontier Economics construction costs make up approx. 30 % (2.5-4.5 Mio. EUR out of total investment costs of 8.7-14.1 Mio. EUR) of the cost for UGC, so such reductions will have a drastic positive influence on price.
Permitting: Simplification of type tests through deregulation, avoiding duplication and usage of harmonization/standardization	Qualification testing is an important technical activity linked to project financing, asset acceptance, and lifetime asset management. However, today most TSOs require running a type test of their own for each project and don't accept already approved tests of the same product from other TSOs. Some TSOs even demand new tests for each project, though the	By reducing the qualification program, we can save time and double digit Mio. EUR for projects.

	same cable type is used. A stronger reliance on existing and further developed international standards, such as IEC and CIGRE, rather than fragmented national or client-specific requirements, would allow qualification evidence to be reused across projects and countries. German standardization and harmonization of type testing per cable type should become the norm by 2032 (before the tender phase of DC42 and DC42+), if necessary, through governmental standards. This would enable qualification costs to be shared, reduce repeated testing of already qualified technologies, and accelerate project delivery.	
Repair Concept	NKT estimates repair times down to 10 days, once the fault is located, which typically is accomplished in under a day. On a conservative basis, and allowing for complications, NKT gives a window of around 3 weeks. In recent overhead line AC cable sabotage acts (Grünheide/Berlin) and Garching/Munich (Bavaria), cable repair was performed in 5 and 4 days after fault occurrence, respectively. For comparison, OHL repair times come with a wide variation (depending on damage severity and accessibility). Replacements in difficult terrain and specifically if emergency restoration is needed, repair might also take up to 2 weeks or even become much longer in multi-circuit damage, e.g., due to external impact by weather extremes. Repair Capacity: TSOs today have a stock available that exceeds by far the expected yearly fault rate. This amount is also enough to trigger additional production of cables and joints if anticipated to be necessary.	A reduction in repair time duration from 21 to 10 days could result in a reduction of around 1.5 - 2 hours of expected unavailability per year per 100 cable-km, reducing redispatch and/or congestion costs each in the range of several 100.000 EUR each year.
Bond fees/security	Most TSOs require financial securities through bonds like Advance Payment Bonds, Performance Bond, and Warranty Bond. Bonds need credit lines and cause fees. Maybe the Government could provide securities to bring down total costs or remove the obligation.	

Socioeconomic advantages for Germany in case of a 4-7 years earlier implementation of DC42/42+ compared to switching to OHL with the following expected delays.

Societal advantage	Description	Estimated savings (range)
Lower electricity prices	Frontier Economics estimates that for each year of delay of DC42/42+, at least 2.15 TWh (up to 4.5 TWh if DC40 and DC41 are not realised before 2044). This amount of electricity will not be fed into the German power system / price zone in each year of delay. This means that there will be less electricity supply, leading to higher electricity prices for both industry and private consumption.	2.15-4.5 TWh makes up 0.4-0.9 % of German electricity consumption of ca. 500 TWh/year. Assumed substitution by marginal gas-generated electricity leads to higher electricity prices.
Fewer imports of fossil fuels	Assuming that 100 % of the redispatched 2.15-4.5 TWh RE-electricity from Northern Germany would have to be generated from natural gas plants, it would correspond to natural gas consumption of around 0.5-1 Bn. cubic meters (assumption of approx. 40 % efficiency in electricity production from natural gas). Since this would be a marginal import instead of just using otherwise not dispatched and almost free electricity from Northern Europe, the natural gas would most likely be imported as LNG from the Middle East or the USA.	With the current Dutch TTF-price of approx. 47 EUR per MWh natural gas, the additional cost for 0.5-1 Bn. cubic meters would be around 250-500 Mio. EUR.
CO2-reductions in Germany	Germany's national climate targets and the EU Climate Law require CO2-reductions. Historically, reductions have been cheapest within ETS1 (including power generation**)**. A realization of 2.15-4.5 TWh otherwise redispatched RE-generated electricity would clearly help Germany achieve CO2-reduction targets by 2040 and remove likely alternative costs for CO2-reductions in other sectors.	Alternative costs for CO2-reductions in sectors like transport or heating are often higher than 150 EUR/ton. 2.15 TWh of electricity produced by natural gas would lead to ca. 1 Mio. tons of CO2 emission with a current ETS-credit price of 75 EUR/ton.
An earlier larger RE-share in the German electricity mix	At least 2.15 TWh higher German RE-production per year from 2037-2040 brings Germany closer to fulfilling its expected national RE-target under an expected 2040-EU-RE-target. In addition, according to EU-legislation a RE-share of at least 90 percent in the German electricity mix would allow electrolyzed hydrogen-production produced by electricity from the common electricity grid to count as "green hydrogen" (higher priced).	Germany would not have to introduce alternative – and most likely more costly – measures to fulfill national and EU RE-targets.
Timely build-out of offshore wind in Germany	The business case for future offshore wind parks in the German EEZ may be weakened in case of the delay of DC42/42+ and following increased redispatch of North Sea offshore wind. A hampered build-out of German offshore wind by 2037 would most likely be substituted by natural gas-generated electricity.	Timely construction of DC42/42+ could increase the likelihood of obtaining more competitive bids on North Sea offshore wind tenders and reduce gas imports.
CEF funding from the EU	SuedWestLink is on the EU's Project of Common Interest (PCI) list, and thus TSOs can apply for EU's CEF-funding. The project has clear European importance due to the North-South connection, thus should be eligible for cost reductions through funding from the EU.	A three-digit EUR-grant would not be unrealistic if a proper CBA is made by TSOs.

Annex 2: Frontier Economics table (NKT translation to English)

Summary of key assumptions and calculations

for the cost-benefit analysis · in €2025

	Underground cable		Overhead line	
Cost item	**Minimum**	**Maximum**	**Minimum**	**Maximum**
Investment costs	€8.7 bn	€14.1 bn	€2.6 bn	€5.3 bn
Planning costs	€0.4 bn	€0.8 bn	€0.2 bn	€0.3 bn
Material costs	€4.7 bn	€5.6 bn	€0.7 bn	€0.7 bn
Construction costs	€2.5 bn	€4.5 bn	€0.5 bn	€0.6 bn
Land costs	€0.2 bn	€0.3 bn	€0.2 bn	€0.1 bn
Grid connection	€0.9 bn	€2.9 bn	€0.9 bn	€2.9 bn
Operating costs	€41 m/year	€44 m/year	€99 m/year	€102 m/year
Maintenance and servicing	€5 m/year	€5 m/year	€11 m/year	€11 m/year
Repairs and restoration	€0.3 m/year	€0.5 m/year	€0.4 m/year	€1.2 m/year
Grid loss costs	€36 m/year	€38 m/year	€87 m/year	€89 m/year
Additional redispatch costs during operation	€27 m/year	€8 m/year	€0/year	€0/year
Costs due to delay				
Year of commissioning	2037	2037	2041	2044
Redispatch costs between commissioning of overhead line and underground cable	€0/year	€0/year	€179 m/year	€190 m/year

Note: Details on the calculations and the corresponding sources for the cost assumptions can be found in Annex A.3.

Source: Frontier Economics 13 May 2026: Kostenanalyse zur Bewertung von Erdkabel und Freileitung (p. 37-38)