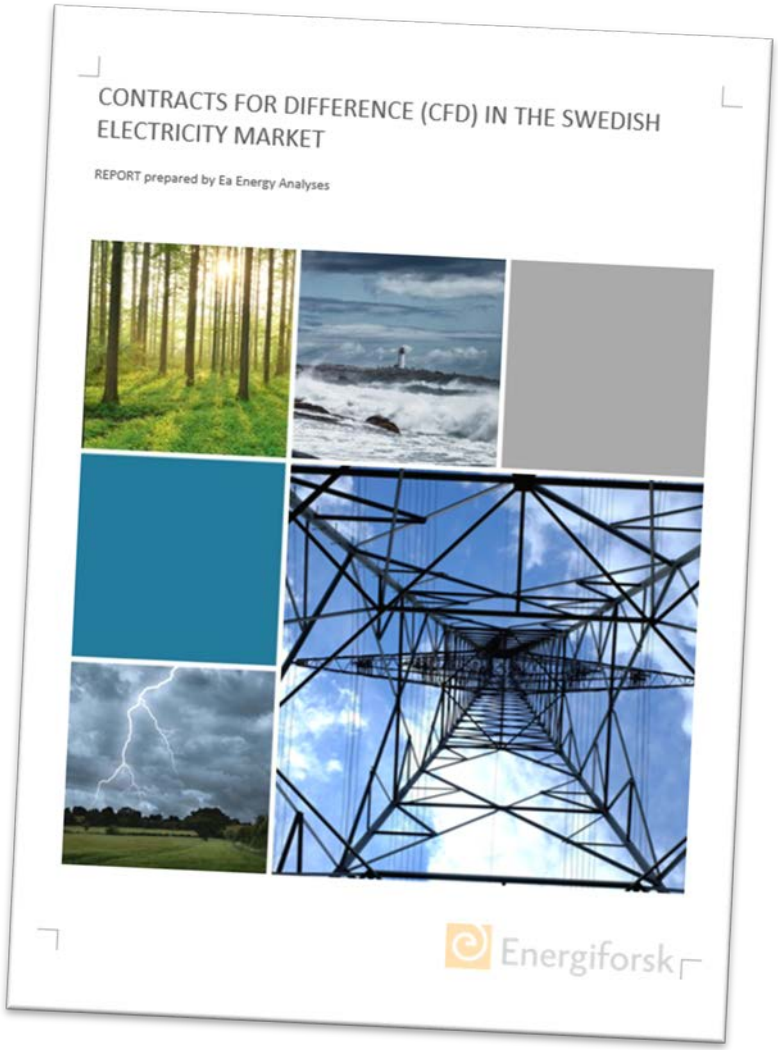
CfDs and the Electricity Market Reform

Ea Energy Analyses

Stockholm, 09 April 2024

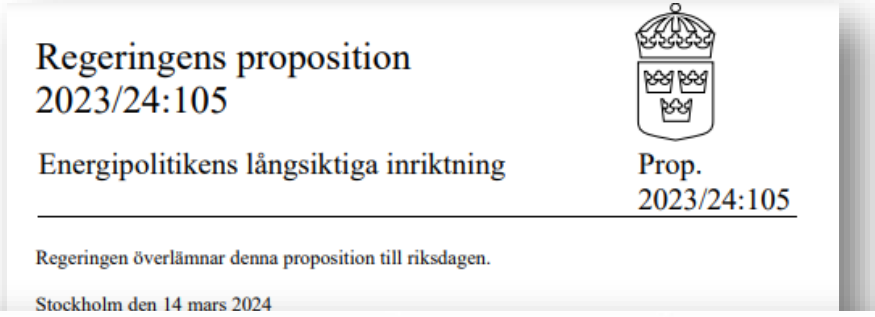
Background

- Objective: Investigate, how CfDs could be designed to serve the objectives of Swedish climate and energy policies while being in compliance with the present proposal accepted by the Council
- Report is based on a literature review and a stakeholder workshop with representatives of Swedish energy companies



Outlook: Sweden's energy system

- Electricity demand is expected to increase markedly. Planning target: 300 TWh by 2045.
- The Swedish government wants to ensure a level playing field between different fossil-free energy sources. At the same time **preference for nuclear energy**: +2,5 GW by 2035,+10 reactors by 2045.
- Huge price differences across the country, with unprecedented levels of electricity prices in central and southern Sweden.
- The Swedish government seeks to harmonise prices between price areas, eventually paving the way for **one unified electricity price zone**.
- The TSO, Svenska Kraftnät, asserts that the energy-only market, will not be able to provide the necessary level of security of supply, and calls for a **market-wide capacity mechanism.**


Regeringens proposition
2023/24:105

Energipolitikens långsiktiga inriktning

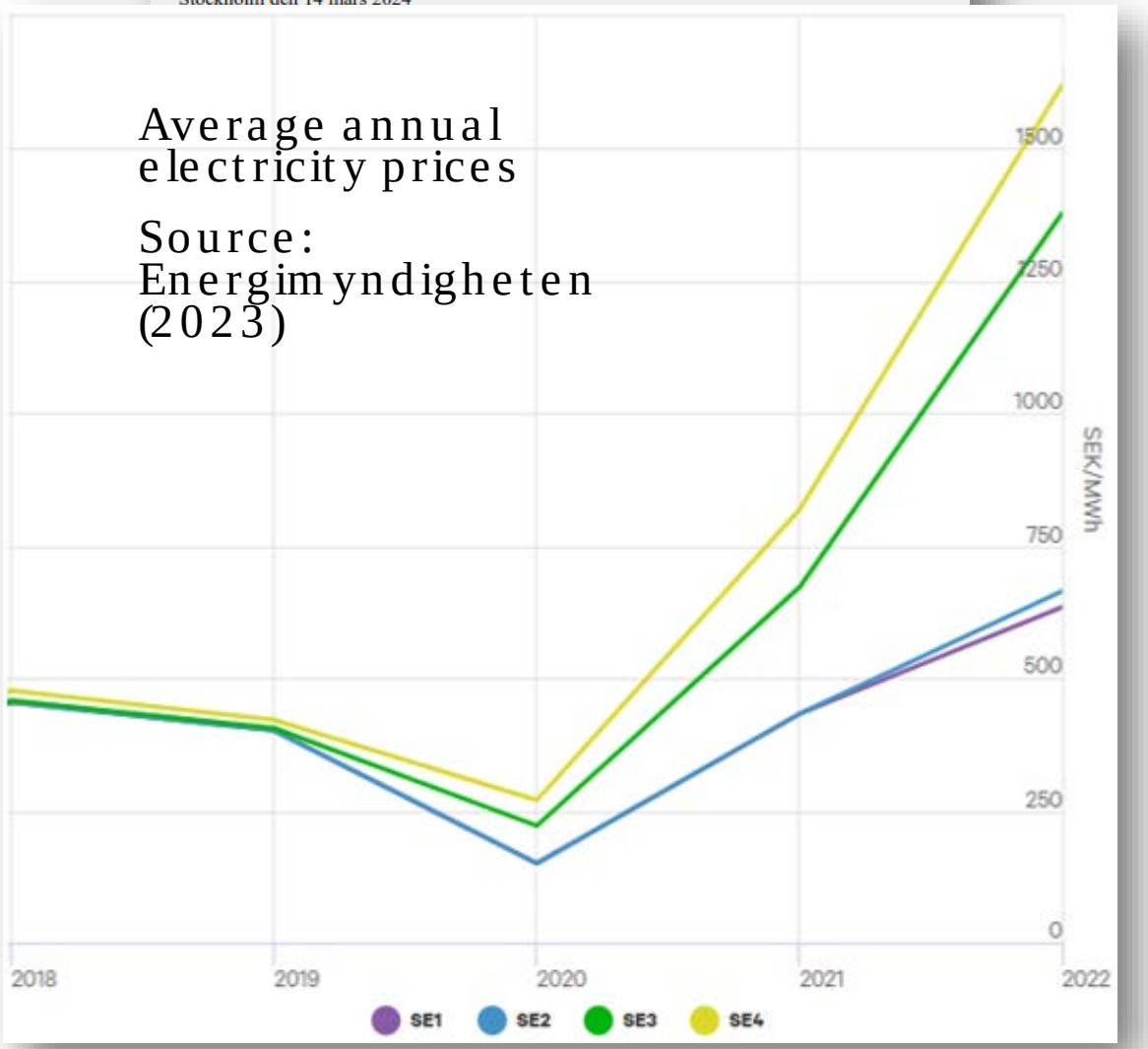
Prop.
2023/24:105

Regeringen överlämnar denna proposition till riksdagen.

Stockholm den 14 mars 2024

Average annual electricity prices

Source: Energimyndigheten (2023)



CfDs in the EU Electricity Market Reform

CfDs have been used for more than 50% of the global offshore wind supply and to support nuclear energy (for example in the UK)

Electricity
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should tal
oir;

- Preserve incentives to operate efficiently in the markets
- Competitive bidding procedure
- Exemptions for small-scale technologies and emerging technologies

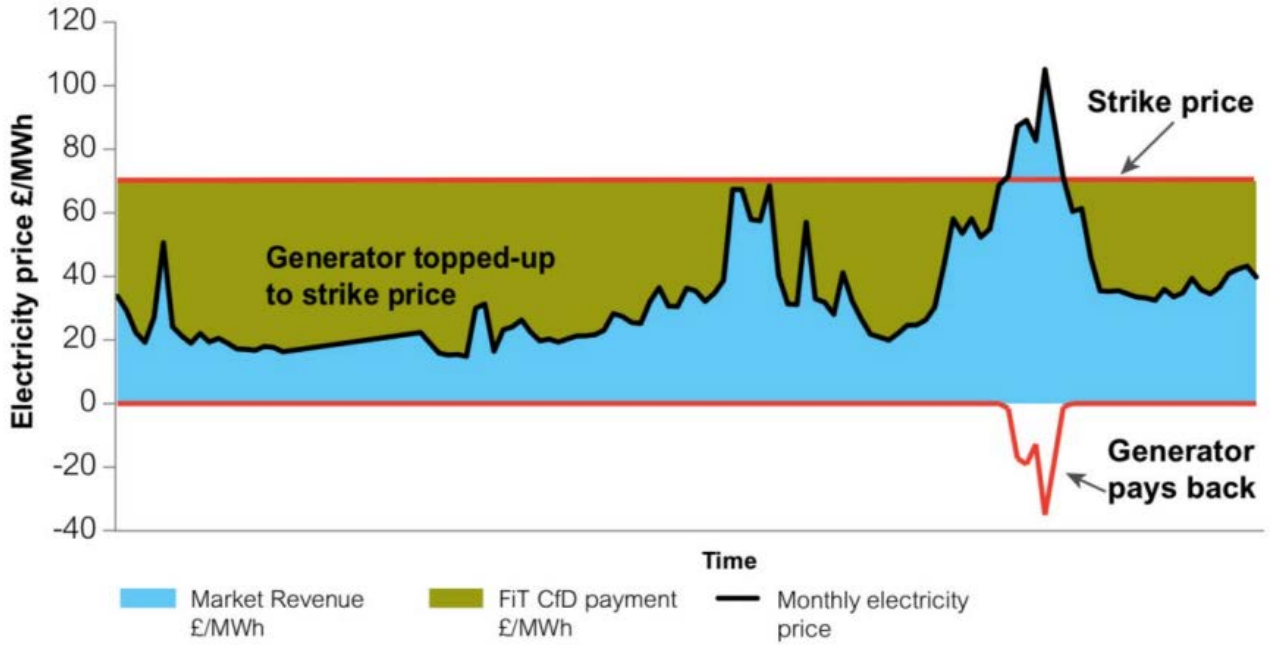
The Council suggested to include not only new power generating facilities, but also **repowering** of existing power generation facilities

Objectives of Contracts for Difference (CfDs)

- **Support carbon free technologies, support climate targets**
- Increase **long-term investment (revenue) stability** for producers
- **Hedge consumers** against high power prices.

Conventional Contract for difference (CfD)

- Minimum **revenue guarantee**
- Minimum strike price is set in an auction
- Contract for 10-25 y
- If day-ahead price is **below** the strike price, the **generator** gets the difference between strike price and the market price
- If day-ahead price is **above** the strike price, the **generator** pays the difference back



https://assets.publishing.service.gov.uk/media/627e3c4be90e0721b3675f3d/CfD_evaluation_phase_1_final_report.pdf

Summary: Pros and Cons of the conventional CfD

Pros

- Revenue guarantee for low-carbon generators
- Increases long-term stability both for producers and for consumers
- **Lower cost of capital** and hence lower levelized energy costs

  (1% lower WACC =>
  4 €/MWh on the LCOE
  for offshore wind)

Cons

- Muted electricity price variation ("produce-and-forget" incentives)
  - Bid at minimum clearing price
- Distortion on intraday and balancing markets
  - Risk that the plant under the CfD will choose not to produce in spite of zero marginal cost.
- Volume risks remain unhedged

Designing CfDs to ensure cost reflective behaviour

How to develop a support scheme that incentivizes CfD off-takers to

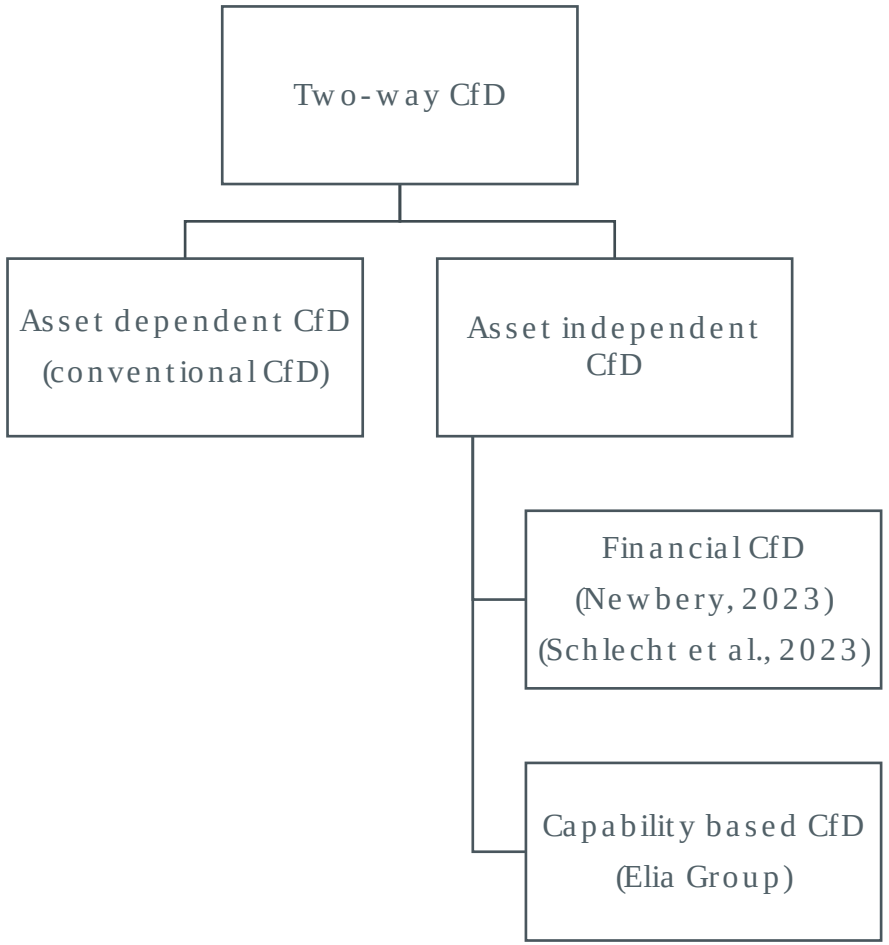
a) **operate** their plants according to price signals in the market and

b) give them incentives to **design and site** plants in a way that optimise their revenues in power markets rather than just maximising the output of the plants?

Different tweaks have been attempted

- Expand the reference period for the CfD
  - Means that the payments from/to the government do not depend on the prices hour by hour, but rather the average prices last month or last year.
  - Improves incentives to operate plants according to market prices and design plants to harvest high prices
  - BUT still issues because payments depend on actual generation. If for example power prices were low last year, this year the power plant would have to pay a fee to the government for each MWh produced skewing incentives to bid at marginal production costs in energy markets.
- No payments in hours with negative prices

Separating revenue from generation



- Core idea is to decouple payments from the tangible production of the asset
- Renumeration based on either
  - the assets anticipated injection,
  - a reference generation profile (wind, solar..)
  - baseload profile
- Financial CfD
  - the government provides a consistent hourly payment,
  - the offtaker reimburses the government with the revenues of the reference generation profile or baseload profile

Geographic-specificity

Given Sweden's four electricity pricing zones, diverse energy resources, and varying population density, CfDs that are specific to each geographic area could be used to encourage efficient investment in non-fossil fuel energy resources.

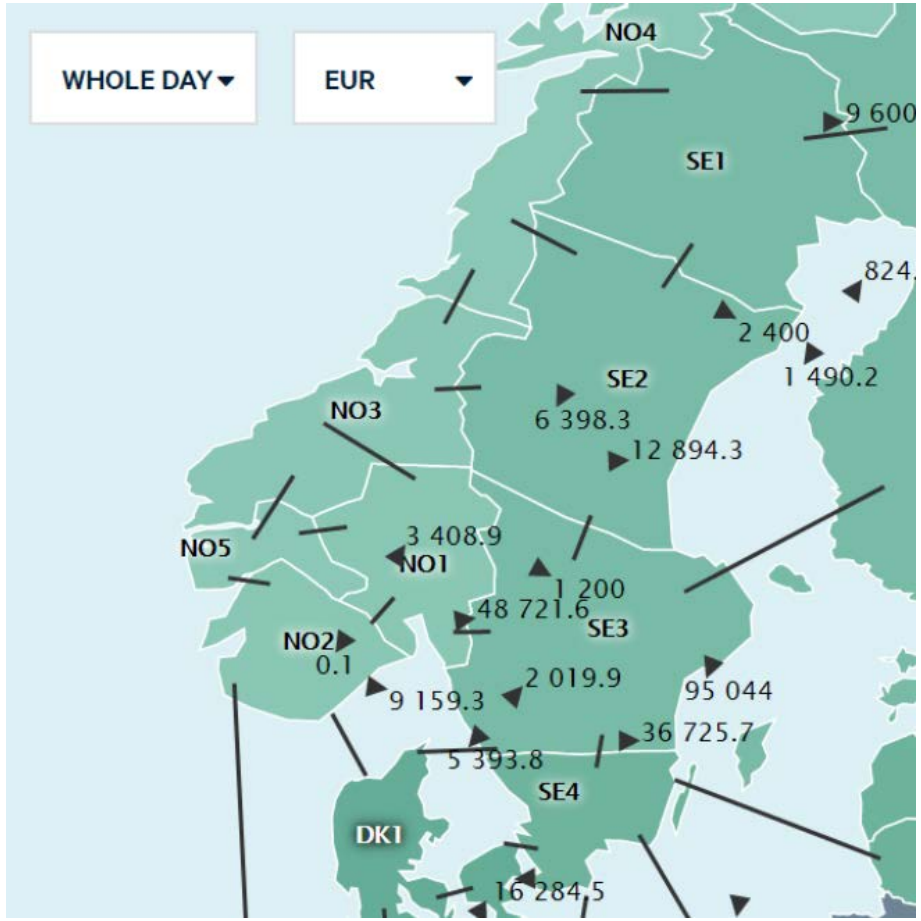
Support specific zones

- Support specific zones with limited access to RES or high population density

Across zones

- Ensure cost-effective bids of different technologies across zones, i.e. based on capture prices

If specific sites are considered, it needs to be determined, if the sites should be matured by government/TSO or by the off-taker of the CfD.



Source: Nord Pool.

Technology specificity

- Technology-neutral CfD, supporting cost-efficient choice
- Technology specific CfD to support specific non-fossil fuel technology

Baseload profiles can be applied to ensure fair competition between types of generators.
However, baseload profiles do not provide same level of hedging for investors as profiles based on a reference plant.

Revenues and need for financing

- Strong emphasis in the reform on **revenues** and how they should be redistributed to consumers in a non-distortive manner.
- Less focus on the potential need for **subsidies** from government or consumers.
- If the average electricity price is below the CfD strike price, the government has to **pay** the difference to the generator.
- **Example**: CfD for 2.5 GW nuclear over the span of 40 years. If the strike price is set to €80/MWh and the average electricity price is €60/MWh, then
  - Annual CfD payment: **4,5 bill SEK** (400 mill. €)
  - Lifetime CfD payment: **179 bill SEK** (16 bill €)
- A technology neutral CfD should **reduce the risk** of excessive subsidies from government side because of improved competition

Thanks to the upward limitation of the market revenues, direct price support schemes in the form of two-way contracts for difference ***or equivalent schemes with the same effects*** should provide an additional source of revenues for Member States in periods of high energy prices. To further mitigate the impact of high electricity prices on the energy bills of consumers, Member States should ensure that the revenues collected from producers subject to direct price support schemes in the form of two-way contracts for difference ***or equivalent schemes with the same effects, or the equivalent in financial value of those revenues,*** are passed on to ***final customers, including household consumers, small and medium enterprises and energy intensive undertakings. When distributing the revenues to households, Member States should in particular be able to favour vulnerable customers or those in energy poverty. In the light of the wider benefits for electricity customers resulting from investments in renewable energy, energy efficiency, and low carbon energy deployment, it should also be possible for Member States to use the revenues from two-way contract for difference or equivalent schemes with the same effects, or the equivalent in financial value of those revenues, to finance investments to reduce*** electricity ***costs for final*** customers ***and***, including ***as regards specific economic activities such as investments in distribution grid development, renewable energy sources and electric vehicle charging infrastructure. It should also be possible for Member States to use such revenues, or the***

Pros and cons of a technology neutral financial baseload CfD

Pros

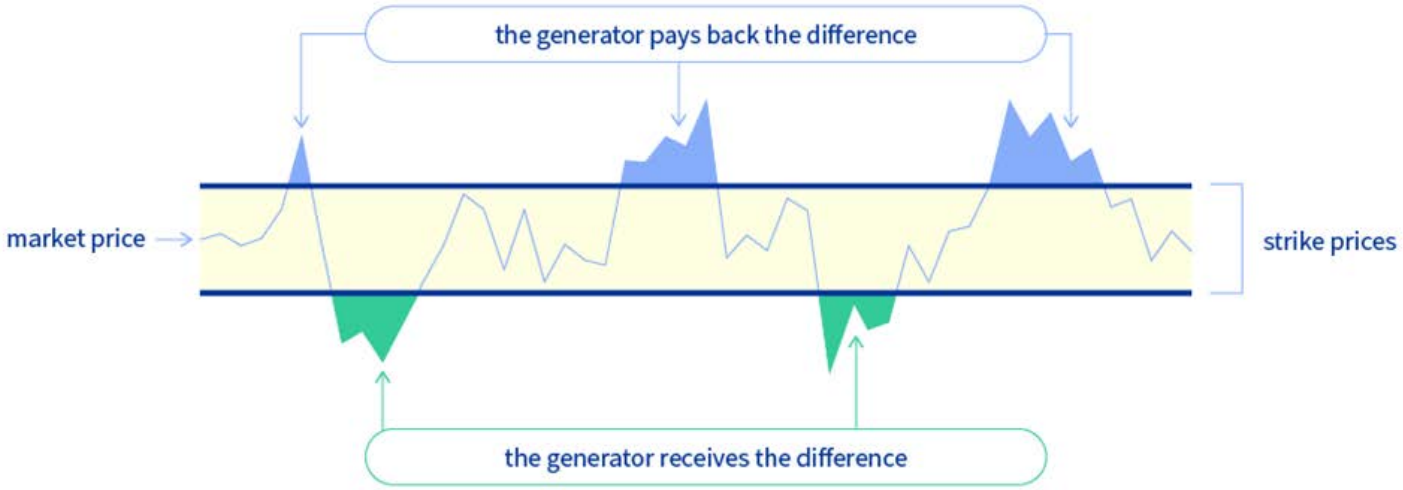
- No distortion of price signals (financial)
- Competition between various technologies should lead to lower subsidy needs (technology neutral)
- Renewable energy proponent get incentive to supplement their investments in RE generators with investment in for example storages to lower their risk (baseload)

Cons

- Less certainty about actual supply (financial)
- Considerable risk for renewable energy developers (baseload)
- Government doesn't determine which technology (technology neutral)
- Does the future energy market require baseload?

Ways to limit government risk

- Cap on strike price
  - XX €/MWh
- Two-strike prices
  - Generator still receives a minimum guarantee, and is exposed to market price signals
- Payment cap
  - XX million €



Two-way Contract for Difference. (Source: Council of the European Union, 2023)

To wrap up

- Following the EU electricity market reform, CfDs should be applied, if the Swedish government wishes to **directly support** renewables or new nuclear power.
- CfDs need be carefully designed to avoid market distortions
- CfDs may be applied to **support specific technologies**
- CfD may also be structured to allow for **competition between technologies**, potentially lowering the need for subsidies
- Consider measures to limit **government risk**
- Tailor the CfDs to **needs** for the Swedish energy system (baseload, peak-load, cheap power..)

For any inquiry, contact:
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Check out our website
or find us on LinkedIn

Principle of a Financial CfD