

What can I choose in the calculator?

The calculator lets you choose the share of CCGT energy in the total electricity production capacity in Switzerland in the selected year (2035 or 2050).

Combined cycle Gas Turbine (CCGT)



Hamm-Uentrop power plant, Tim Reckmann, via Wikimedia Commons

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IMPACT - What are the impacts of CCGT plants?

In Switzerland, increasing the share of CCGT energy in the total electricity production capacity will have the following impacts:

Energy system

☹️ Increase primary energy demand as it would replace hydro or nuclear that have lower primary

energy inputs.

- ☹️ Increase total fossil fuel consumption.
- ☹️ Likely to decrease the share of renewable energy sources in the energy mix.
- ☹️ Likely to decrease energy independence by increasing fossil imports.
- 😊 Likely to improve grid stability and security by providing responsive, dispatchable generating capacity.

Environment & Climate

- 😊 Likely to increase global CO2 emissions. (Note that this conclusion is specific to Switzerland; in other countries CCGT plants could reduce CO2 emissions)

Society & Economy

- 😊 Likely reduce the cost of the energy transition.
- 😊 May reduce total cost of ownership of vehicles.
- ☹️ May worsen balance of payments by increasing fossil imports.
- 😊 May increase Confederation income from the tax on mineral oil under the current taxation system.

DEFINITION / CONSTRAINTS

DEFINITION - What is a CCGT plant?

A Combined Cycle Gas Turbine (CCGT) plant uses two thermodynamic cycles successively to generate electricity with a high overall efficiency. A gas turbine first burns natural gas or heating oil and drives a generator (gas cycle). Waste heat from the gas turbine is used to generate steam which drives a steam turbine and generates thus additional electricity (steam cycle).

State of the art CCGT plants can reach an overall electrical efficiency of about 50–60%.

CONSTRAINTS - What are the key barriers facing CCGT plants deployment?

- CCGTs are mature, commercial technology that can be deployed comparatively easily.
- A significant shift towards CCGTs would likely, however, necessitate the development of additional natural gas supply transport capacities with neighbour countries.

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li.next { width: 11px; height: 20px; } .pagination ul li.prev, .pagination ul li.nobl, .pagination ul li.next
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transform: uppercase; } #sponsorsWrapper .sponsor { float: left; margin-right: 60px; } .dokuwiki
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ASSUMPTIONS - WHAT ARE THE ASSUMPTIONS CONSIDERED IN THE CALCULATOR?

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.news h2 { font-family: 'ProximaNovaCond-Regular'; font-size: 28px; margin-bottom: 15px; }
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.pagination ul li.next { width: 11px; height: 20px; } .pagination ul li.prev, .pagination ul li.nobl,
.pagination ul li.next { border-left: 0; } .paddedContent { padding: 20px; } #sponsorsWrapper h2 {
font-family: 'ProximaNovaCond-Regular'; font-size: 14px; text-transform: uppercase; } .dokuwiki
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In Switzerland there are currently three CCGT power plants: Monthey (55 MWe), Pierre-de-Plan (34 MWe) and Cornaux (43 MWe) ^[1]. These power plants are actually cogeneration plants (heat&electricity generation) because of the existence of a law that fixes a bottom energy efficiency (58.5% for existing plants and 62% for new plants ^[1]) which cannot be reached unless cogeneration is done. Thus there is no assumption for 2011 as the existing plants are part of the [centralized cogeneration technologies](#).

Next tables contain the assumptions that have been introduced in the CCGT energy model of the calculator.

Capacity factor

2035	2050
Variable	

Efficiency [%]

	2035	2050
Without CCS	63 ^[2]	65 ^[2]
With CCS	57 ^[2]	61 ^[2]

Emissions

	2035		2050	
	Without CCS	With CCS	Without CCS	With CCS
CO ₂ -eq. emissions [kgCO ₂ -eq./kWh _e]	0.376	0.111	0.361	0.0934
Deposited waste [UBP/kWh _e]	0.684	3.88	0.645	3.33

Cost				
	2035		2050	
	Without CCS	With CCS	Without CCS	With CCS
Specific investment [CHF ₂₀₁₀ /kW _e]	914	1'537	877	1'392

VALUE RANGE - WHAT RANGE OF VALUES CAN I CHOOSE?

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font-size: 26px; text-transform: uppercase; color: #1d1d1b; margin-bottom: 20px; } /* TEXTE PAGES
ET ADMION */ #content.text, .redactor_box { font-family: Arial, Helvetica, Sans Serif; font-size: 16px;
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#content.text #wysiwyg, .redactor_box #wysiwyg { margin-bottom: 80px; } hr { background: none;
border: none; border-top: 1px solid #c2c2c2; } hr.marged { margin: 40px 0; } .pagination { margin:
20px auto 40px auto; height: 20px; } .pagination ul li { float: left; padding: 0 10px; border-left: 1px
solid #c2c2c2; } .pagination ul li a { font-family: 'ProximaNovaCond-Light'; font-size: 20px; line-
height: 23px; color: #797a7f; } .pagination ul li a.active { color: #000; } .pagination ul li.prev,
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font-family: 'ProximaNovaCond-Regular'; font-size: 14px; text-transform: uppercase; } .dokuwiki
div.page { overflow: auto; }
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MIN Value: 0 GW

MAX Value:

2035	10 GW
2050	

REFERENCES

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text-transform: uppercase; margin: 0; } #wrapper #content .bloc.bgWhite { background: #fff; }
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[1] [VSE\(2012\), Centrales à gaz à cycle combiné \(CCC\)](#)

[2] [NEEDS project\(2008\), Final report on technical data, costs, and life cycle inventories of advanced fossil power generation systems](#)

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