

# **Integrating Climate into Fiscal Sustainability Analysis: Experiences from a Swiss pilot study**

**Coalition of Finance Ministers for Climate Action  
Helsinki Principle 4 Workshop, 2. October 2024**

**Benjamin Lerch and Thomas Brändle**  
Swiss Federal Department of Finance (FFA)  
Economic and Monetary Policy

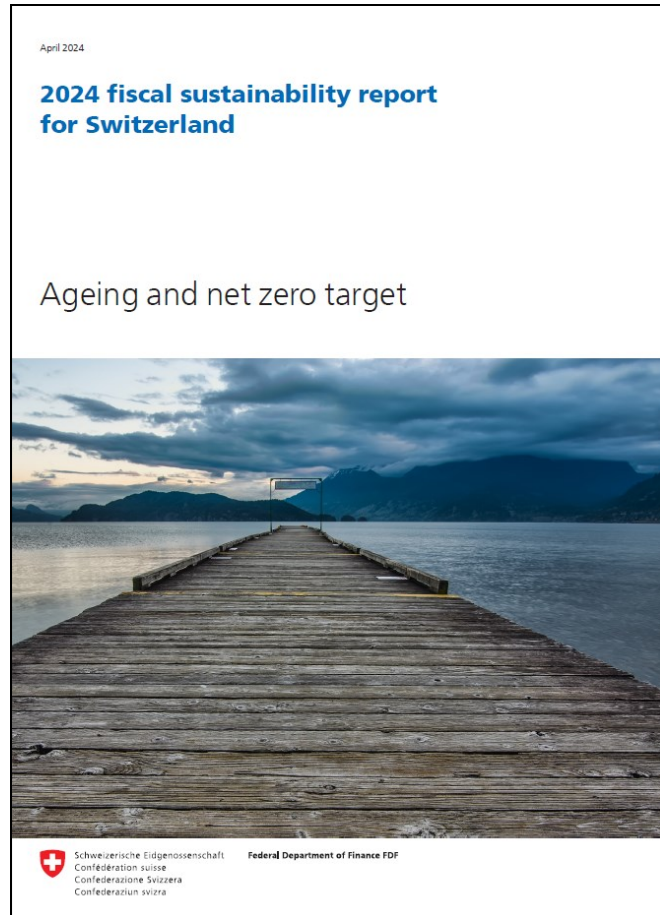


# Setting the scene

- Swiss Federal Department of Finance publishes its fiscal sustainability report every 4 years
- This flagship report goes beyond the budget and the financial plan, focusing on long-term structural challenges to public finances, such as population ageing
- The 2024 report includes, for the first time, a model-based pilot study to project the long-term fiscal impact of climate mitigation policies to achieve the net-zero emissions target
- Focus on:
  - Development of revenues, expenditure, budget balance and public debt until 2060
  - All levels of government, including social security funds
  - Different policy mixes, including carbon pricing, regulation and subsidies
- The costs of climate change and climate adaptation measures could not be included in the analysis due to uncertainties and lack of data and modelling tools

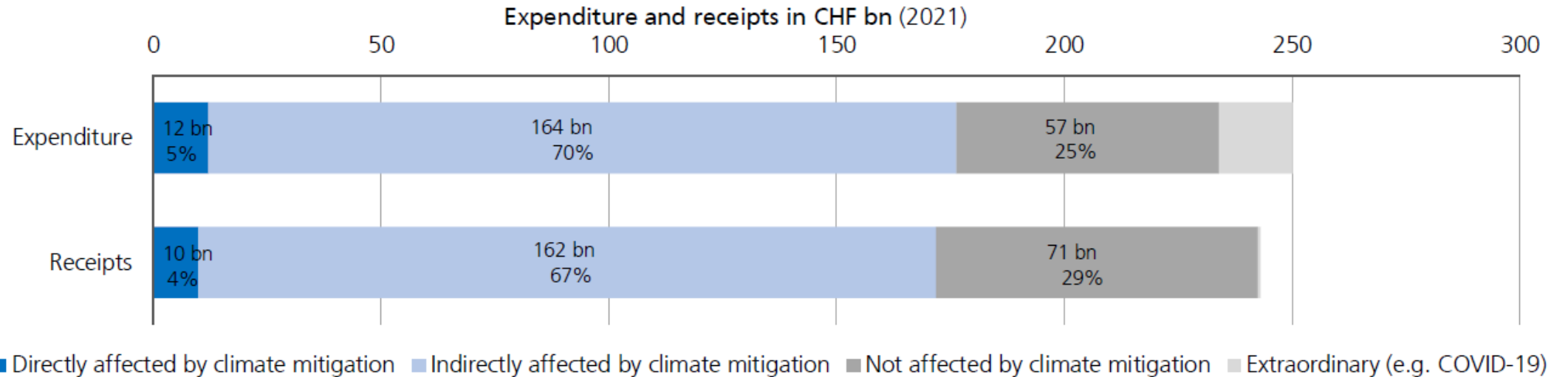


# Climate mitigation and public finances





# Revenues and expenditure affected by climate mitigation measures in 2021



Source: Ecoplan (2024)

- **Direct:** e.g. mineral oil tax, CO2 levy on thermal fuels and public expenditure in buildings program of Confederation and Cantons
- **Indirectly affected by economic growth (GDP, consumption, wages):** e.g. direct taxes, VAT and personnel expenditure

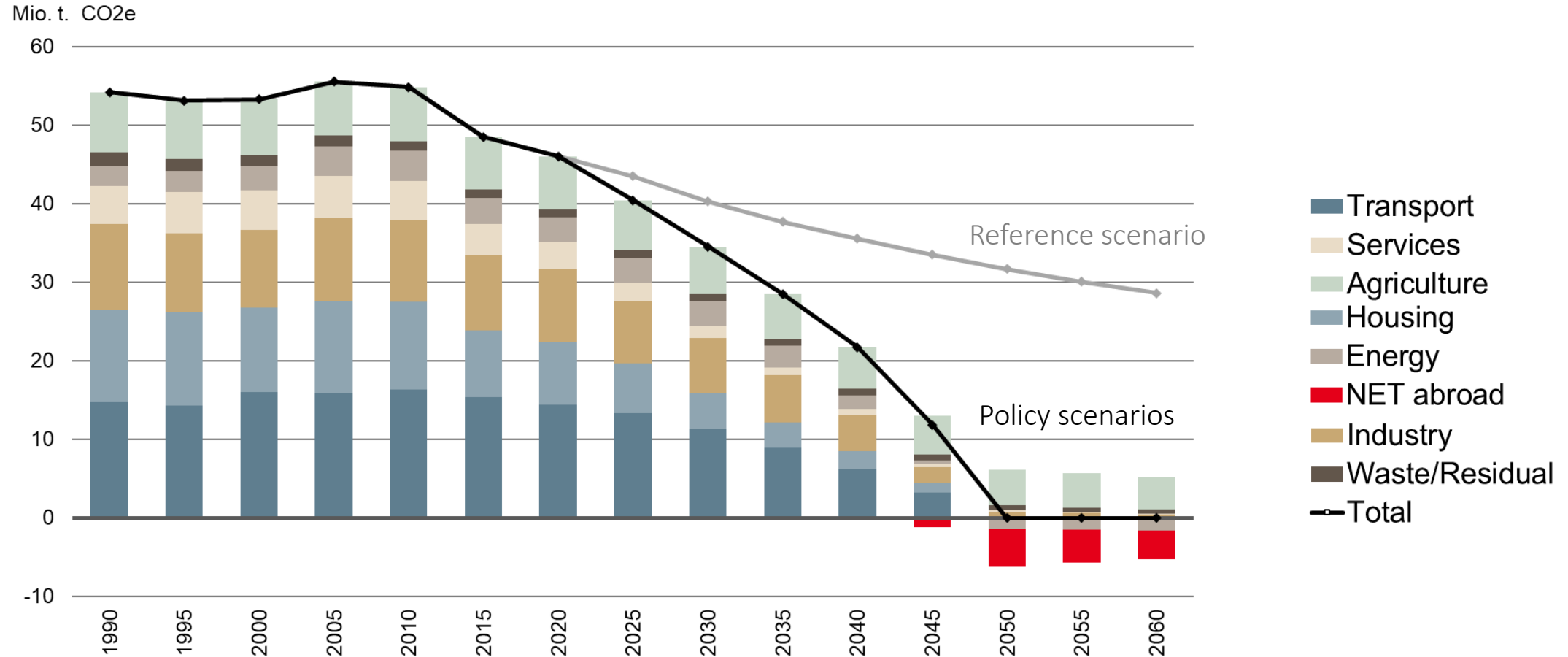


# Projection framework

- Revenue and expenditures for all levels of government and social security funds are projected up to 2060
- Pilot study based on the Energy Perspectives 2050+ from DETEC, which analyzed the transition of the energy system (**energy system models**) and the macroeconomic impacts (**CGE**) of achieving net-zero emissions
- Assumptions from the federal government's legislative financial plan, fiscal rules are assumed to be non-binding
- **Reference scenario** (business-as-usual) vs. **policy scenarios** in which the net-zero target is achieved by 2050 (carbon pricing, emissions standards, subsidies)
- Differences in the development of public finances between the reference scenario and the policy scenarios are the key variables of the analysis



# Emissions reduction path to net zero



Source: Ecoplan (2024) based on Energy Perspectives 2050+

Notes: NET = Negative emissions technologies.



# Overview of scenarios

		Policy scenarios for achieving the net zero target by 2050			
Source of emissions	Reference scenario (BAU)	Policy scenario 1	Policy scenario 2	Policy scenario 3	Policy scenario 4
Energy-intensive industries	Emissions trading system (linked to EU-ETS)				
Thermal fossil fuels (e.g. heating oil, natural gas)	CO <sub>2</sub> levy (CHF 96/t CO <sub>2</sub> )	CO <sub>2</sub> levy (CHF 96/t to max. CHF 500/t CO <sub>2</sub> )		a) Emissions standards b) CO <sub>2</sub> levy (CHF 120 /t CO <sub>2</sub> )	a) Emissions standards b) CO <sub>2</sub> levy (CHF 120 /t CO <sub>2</sub> ) c) CIA federal subsidies
Motor fossil fuels (e.g. petrol, diesel)	No regulation	Emissions standards	CO <sub>2</sub> levy (CHF 0 to max CHF 400/t CO <sub>2</sub> )	Emissions standards	
Electricity production	No regulation	Exogenously determined minimum quotas for production from renewable energies			
Other (mainly agriculture, waste and industrial processes)	No regulation	Utilisation of carbon capture and storage (CCS) and negative emission technologies (NET).Financed by polluters			Utilisation of CCS and NET. NET financed by federal subsidies
Replacement levies	Replacement levies to compensate for mineral oil tax (incl. surcharge), LSVA (from 2030) and motor vehicle taxes (from 2028)				

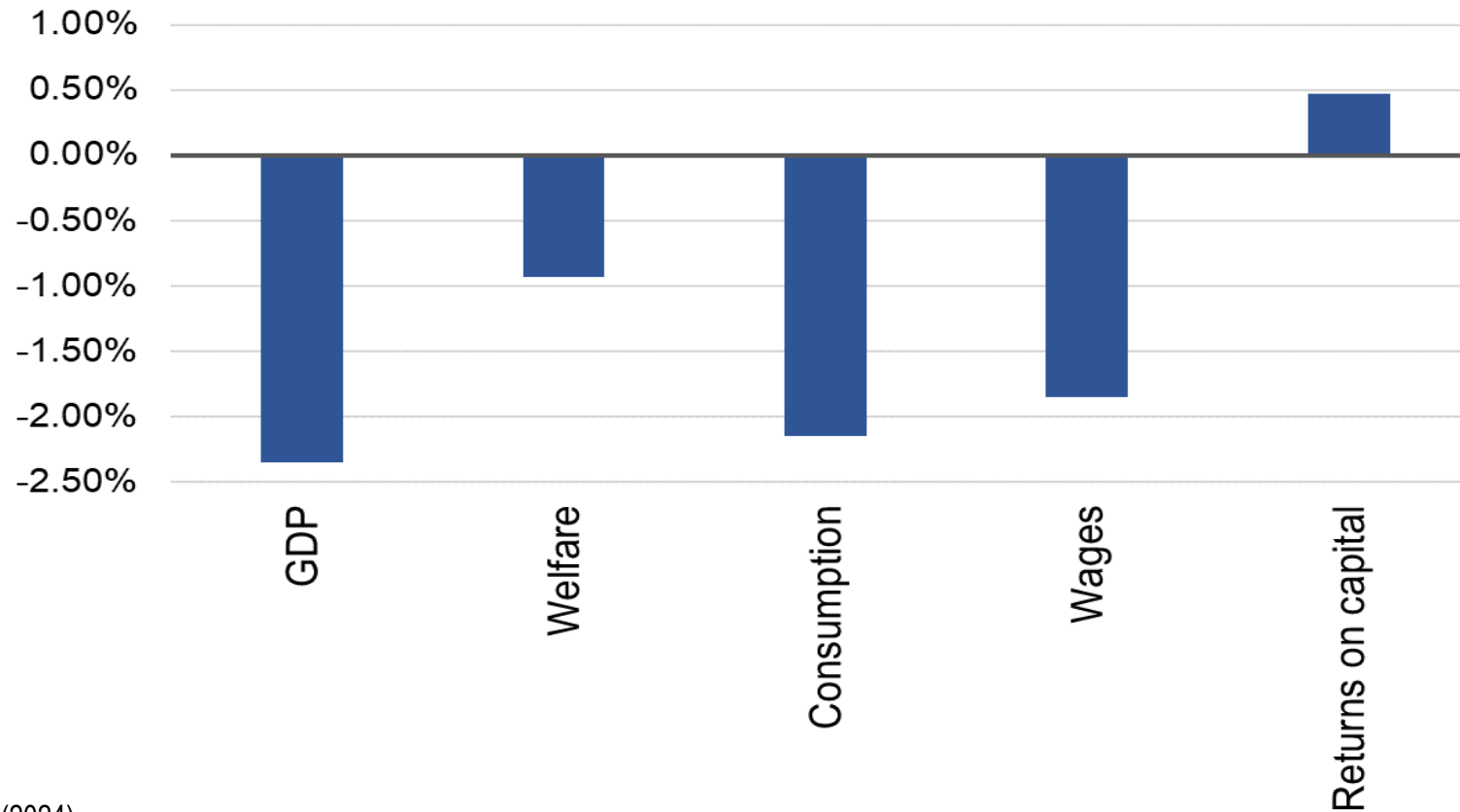
Source: Illustration based on Ecoplan (2024)

Notes: In the reference scenario, based on the Energy Perspectives 2050+, all of the energy and climate policy measures and instruments that were in force by the end of 2018 are continued. The level of the CO<sub>2</sub> levy on fuels is below the value of CHF 120 per tonne of CO<sub>2</sub> introduced from 2022.



# Climate mitigation slows economic growth

Impact of climate mitigation measures in policy scenario 1 on **macroeconomic aggregates** compared to the reference scenario (2060, level effects in %)



Source: Ecoplan (2024)

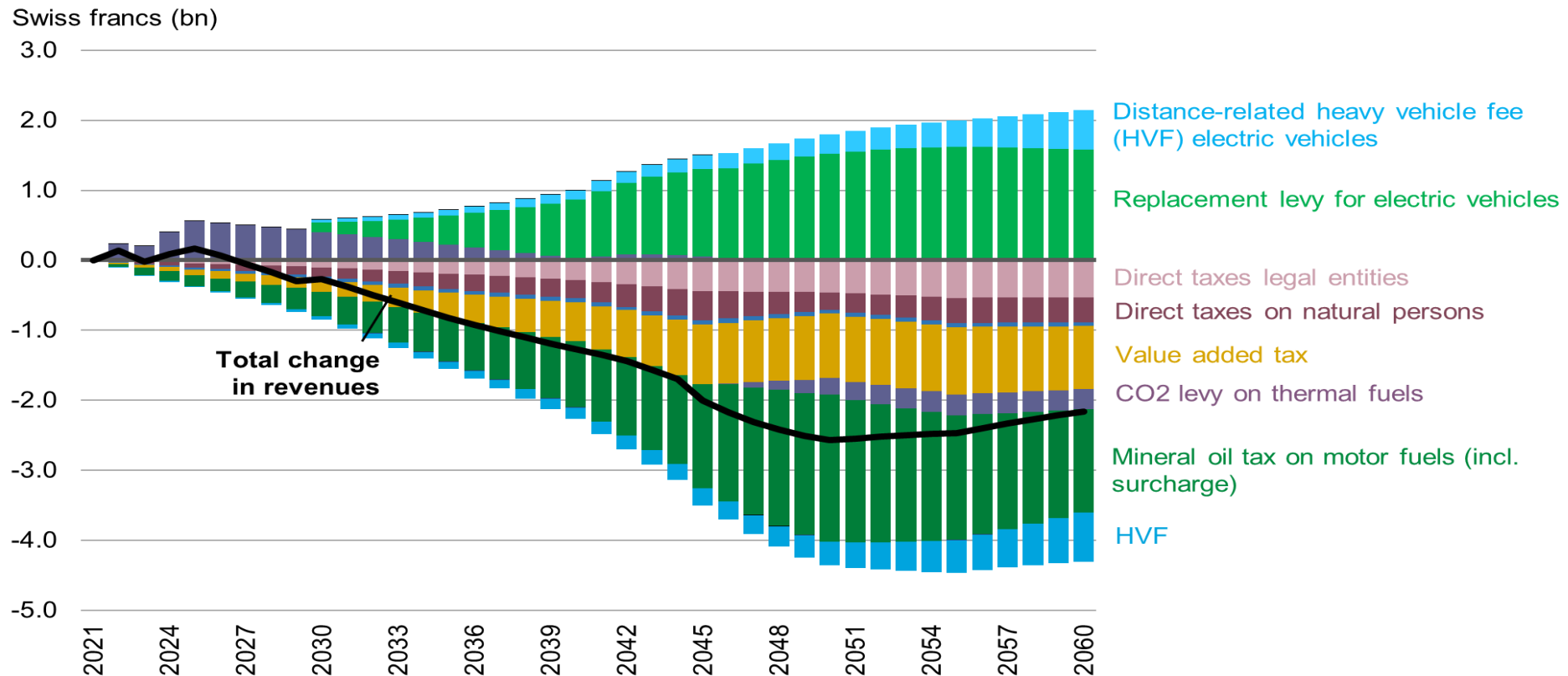
Notes: Differences between macroeconomic outcomes in the policy scenario and the reference scenario.





# Climate mitigation decreases revenue growth

Impact of climate mitigation measures in policy scenario 1 on **federal revenues** compared to the reference scenario (in CHF bn at 2021 prices)



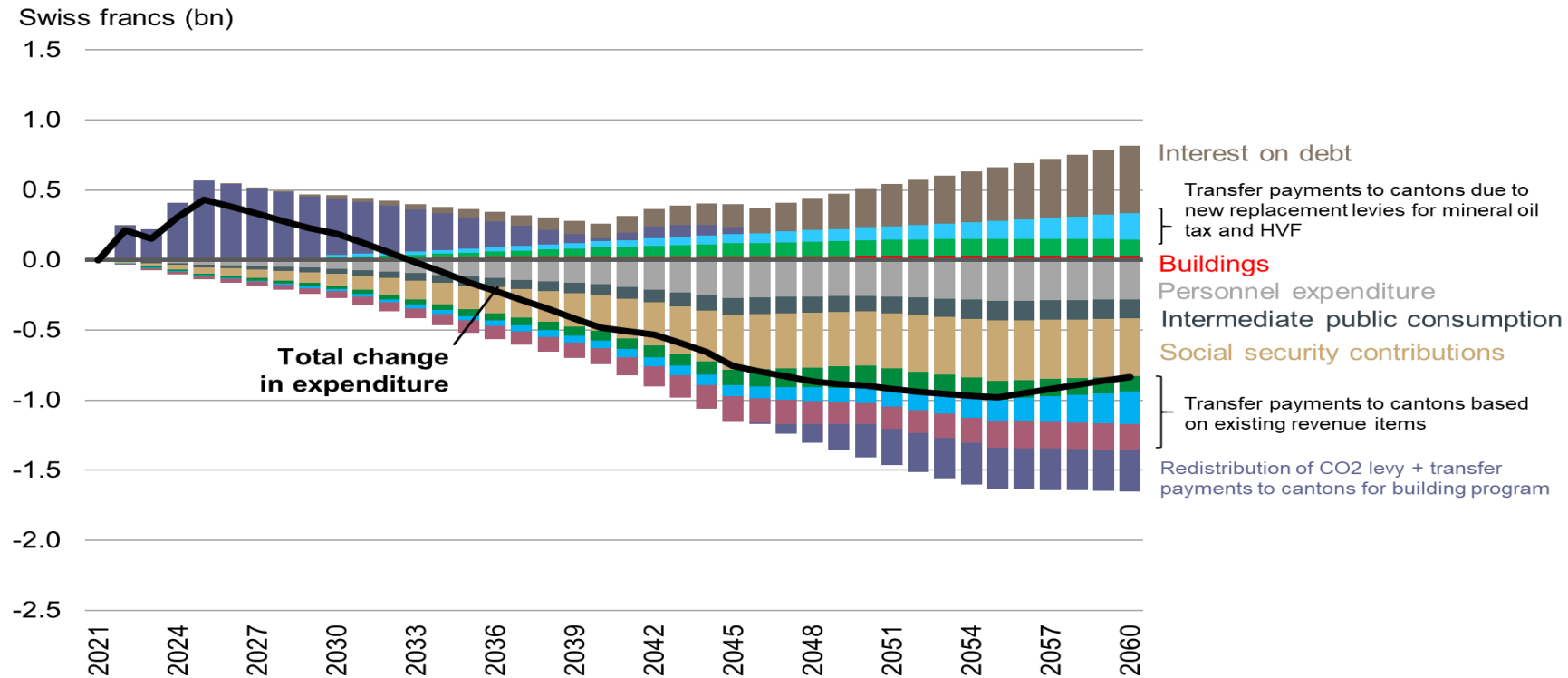
Source: Ecoplan (2024)

Notes: Differences between revenue in the policy scenario and the reference scenario in billions of francs at 2021 prices. In 2060, revenues in the policy scenario are about CHF 2.2 billion lower than in the reference scenario, i.e. 1.7% of total ordinary revenues of the federal government in 2060.



# Climate mitigation decreases expenditure growth

Impact of climate mitigation measures in policy scenario 1 on **federal expenditure** compared to the reference scenario (in CHF bn at 2021 prices)



Source: Ecoplan (2024)

Notes: Differences between expenditure in the policy scenario and the reference scenario in billions of francs at 2021 prices. Transfers to cantons include the cantonal shares of mineral oil tax, the HVF and direct federal tax. In 2060, expenditures in the policy scenario are about CHF 0.9 billion lower than in the reference scenario, i.e. 0.7% of total ordinary expenditure of the federal government in 2060.



# Climate mitigation increases pressure on public finances

Impact of climate mitigation measures on the **budget balance** by level of government in policy scenario 1 compared to the reference scenario (in CHF bn at 2021 prices)

Government level	2030	2040	2050	2060
<b>Confederation</b>	<b>-0.4</b>	<b>-0.7</b>	<b>-1.7</b>	<b>-1.3</b>
in % of Confederation total receipts, reference scenario	0.5%	0.7%	1.5%	1.0%
<b>Cantons</b>	<b>-0.3</b>	<b>-0.4</b>	<b>-0.1</b>	<b>-0.4</b>
in % of cantons total receipts, reference scenario	0.3%	0.3%	0.1%	0.2%
<b>Communes</b>	<b>-0.2</b>	<b>-0.3</b>	<b>-0.1</b>	<b>-0.2</b>
in % of communes total receipts, reference scenario	0.3%	0.4%	0.1%	0.3%
<b>Social security funds</b>	<b>-0.4</b>	<b>-0.8</b>	<b>-0.9</b>	<b>-1.4</b>
in % of social security funds total receipts, reference scenario	0.5%	0.9%	0.9%	1.2%
<b>General government</b>	<b>-1.3</b>	<b>-2.1</b>	<b>-2.8</b>	<b>-3.4</b>
in % of general government total receipts, reference scenario	0.5%	0.7%	0.8%	0.8%
in % GDP, reference scenario	0.2%	0.2%	0.3%	0.3%

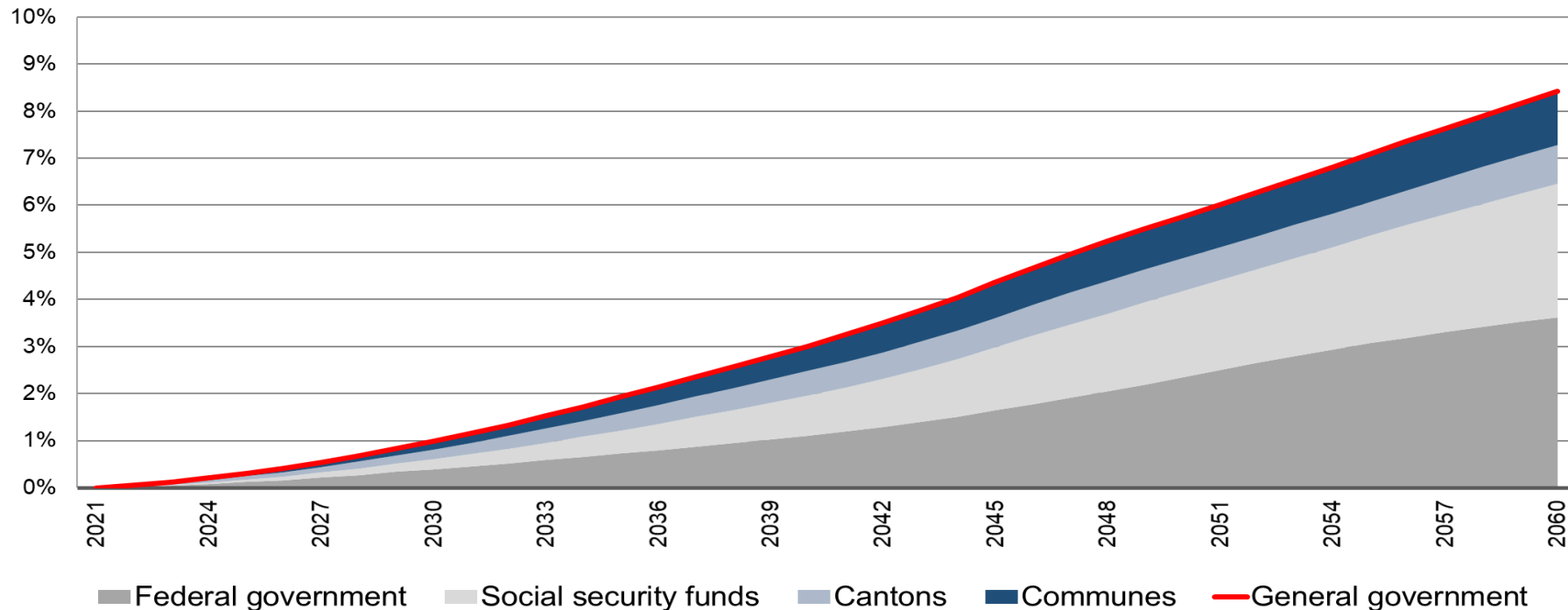
Source: Ecoplan (2024)



# Climate mitigation will increase public debt

Impact of climate mitigation measures in policy scenario 1 on the **debt ratio** by level of government compared to the reference scenario (in percentage points)

in percentage points



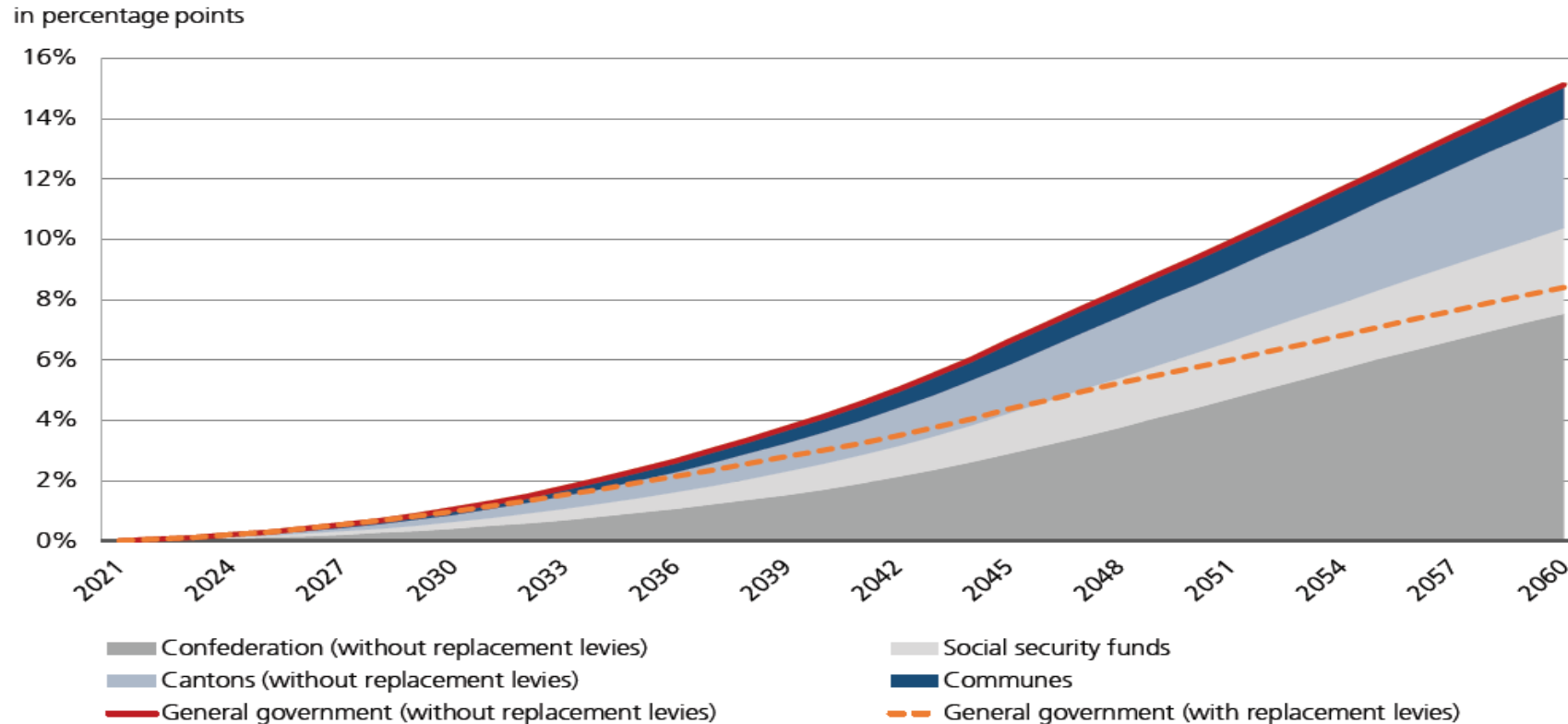
Source: Illustration based on Ecoplan (2024)

Notes: Differences between the debt ratio in the policy scenario and the reference scenario as a percentage of GDP.



# Replacement levies crucial for long-term fiscal sustainability

Impact of climate mitigation measures in policy scenario 1 on the **debt ratio** by level of government compared to the reference scenario (in percentage points)



Source: Illustration based on Ecoplan (2024)

Notes: Differences between the debt ratio in the policy scenario and the reference scenario as a percentage of GDP.



# Subsidies will increase fiscal pressure further

Impact of climate mitigation measures on the **debt ratio** in policy scenarios 1 to 4 compared to the reference scenario (in percentage points)

	Policy scenario 1				Policy scenario 2 (CO <sub>2</sub> levy)			
Government level	2030	2040	2050	2060	2030	2040	2050	2060
Confederation	0.4%	1.1%	2.3%	3.6%	0.4%	1.1%	2.4%	3.7%
Cantons	0.2%	0.5%	0.7%	0.8%	0.2%	0.6%	0.8%	1.2%
Communes	0.2%	0.5%	0.9%	1.1%	0.2%	0.5%	1.0%	1.3%
Social security funds	0.2%	0.9%	1.8%	2.8%	0.2%	0.8%	1.9%	3.2%
General government	1.0%	3.0%	5.8%	8.4%	1.0%	2.9%	6.1%	9.4%
	Policy scenario 3 (regulation)				Policy scenario 4 (subsidies)			
Government level	2030	2040	2050	2060	2030	2040	2050	2060
Confederation	0.4%	1.2%	2.5%	3.8%	0.7%	1.6%	3.5%	5.8%
Cantons	0.2%	0.5%	0.7%	0.9%	0.2%	0.5%	0.7%	0.9%
Communes	0.2%	0.6%	0.9%	1.2%	0.2%	0.6%	0.9%	1.2%
Social security funds	0.2%	1.0%	2.2%	3.3%	0.3%	1.1%	2.2%	3.2%
General government	1.0%	3.3%	6.4%	9.2%	1.3%	3.8%	7.4%	11.0%

Source: Illustration based on Ecoplan (2024)



# Take-aways

- Pilot study analyses the long-term impact of climate mitigation policies on public finances as part of our fiscal sustainability report
- According to our projections, the path to net zero will increase fiscal pressure
  - Public budgets are mainly affected on the revenue side, both through direct and indirect effects
  - The federal government and social security funds will be hit hardest
  - The introduction of replacement levies is crucial to compensate for revenue losses from fuel taxes while the use of subsidies would increase fiscal pressure further



# Pilot study experiences

## *Public attention*

- The report was well received by political decision-makers across policy domains, academics, national and international experts and the media

## *Learnings*

- The impact of climate policy on emissions, the economy and fiscal aggregates is complex and requires interdisciplinary knowledge across ministries:
  - Comprehensive study by the Department of Energy and Environment on the impact of the green transition on the energy system and the economy as a prerequisite
  - Modelling should balance detail and pragmatism
  - Provide policy-relevant results that are easy to communicate and emphasize the pilot nature of the study
- Resource constraints must be considered
  - Cooperation with specialized institutes (outsourcing)





## Next steps

- To support and inform the debate, we intend to include again an analysis of climate-related impacts on public finances in our next fiscal sustainability report (in 2028)
- Such an analysis may include:
  - An update on the fiscal impacts of climate mitigation measures to reflect changes in the energy and climate policy environment
  - An assessment of the fiscal impact of the physical risks posed by climate change
- Accounting for the physical risks of climate change would allow us to quantify the benefits of climate mitigation, enabling a cost-benefit analysis of climate policies

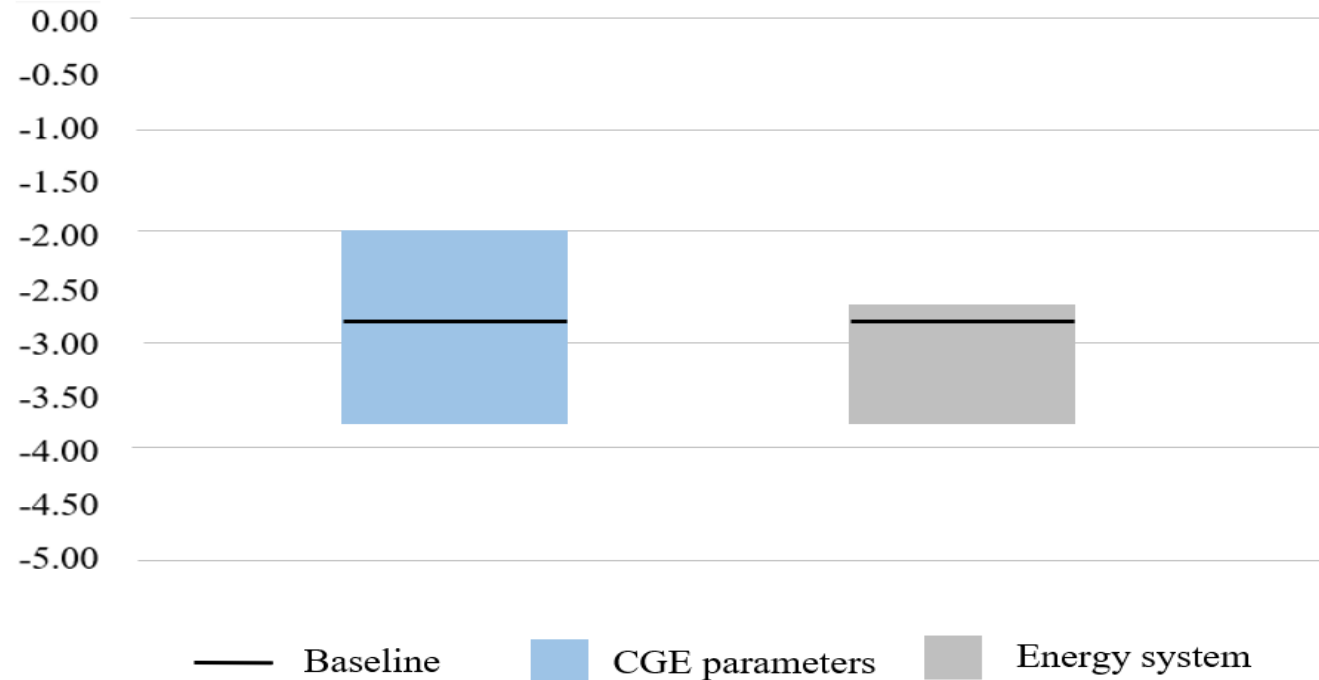


# Appendix



# Sensitivity analysis

Impact of climate mitigation measures on the **budget balance** of the general government in policy scenario 1 compared to the reference scenario (in CHF bn at 2021 prices)



Source: Illustration based on Ecoplan (2024)

Notes: The sensitivity analysis includes alternative assumptions on capital mobility, labor market flexibility, capital, labor, energy and material (KLEM) elasticities, substitution possibilities in the transportation and energy sectors, and trade elasticities to price changes. Each parameter is substituted with a higher or lower value than in the baseline CGE specification. Moreover, a sensitivity analysis was conducted on assumptions related to the energy system using higher and lower values of selected parameters than in the baseline, including electricity production, as well as costs and potentials of NET and synthetic fuels (synfuels).



# Literature

Ecoplan (2024). Langfristige Auswirkungen des Netto-Null-Ziels in der Klimapolitik auf die öffentlichen Finanzen, Grundlagen für die «Langfristperspektiven der öffentlichen Finanzen der Schweiz», Bern.

Department of the Environment, Transport, Energy and Communications, DETEC (2022). Energieperspektiven 2050+, Bern.

Department of the Environment, Transport, Energy and Communications, DETEC (2022). Energieperspektiven 2050+, Volkswirtschaftliche Auswirkungen: Analyse mit einem Mehrländer-Gleichgewichtsmodell – Annahmen, Szenarien, Ergebnisse, Bern.

Federal Department of Finance, FDF (2024). 2024 Fiscal Sustainability Report of Switzerland: Ageing and Net Zero Target, Bern.