



Informal Technical Expert Meeting: tools and methodologies for assessing the impacts of the implementation of response measures

18/05/2021

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ERCST

Roundtable on
Climate Change and
Sustainable Transition



Agenda

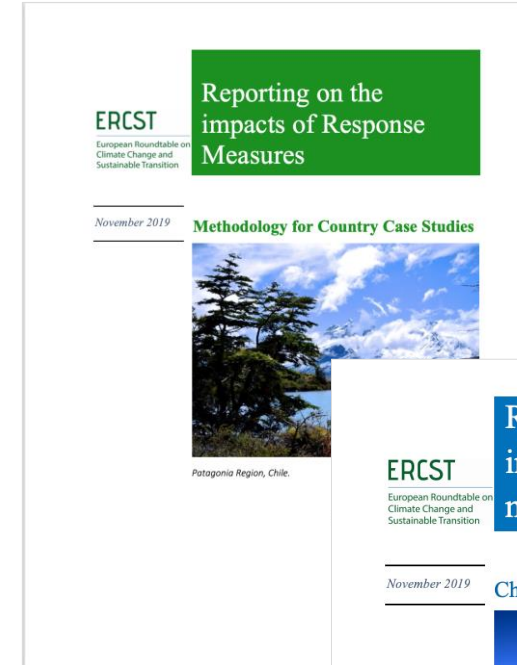
1. ERCST's Methodology
2. Ghana Case Study
3. Lessons Learnt from Chile Case Study

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ERCST's work on Response Measures

- **In 2018**, ERCST launched an informal dialogue on response measures, bringing together UNFCCC negotiators and key stakeholders to discuss this issue and its negotiations under the UNFCCC.
- **In 2019**, ERCST continued this informal dialogue on response measures, focusing on the agreed work programme in Katowice. ERCST also carried out a case study on “reporting on response measures under biennial update reporting” in Chile.
- **In late 2020**, ERCST has started developing a new case study for Ghana. This work will continue throughout 2021 and the information of the dialogue will be shared with the KCI.
- **Limited methodologies** on identification and quantification on the impacts of response measures



ERCST,2019



ERCST,2019

Methodology for Country Case Study: Ghana

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- STEP 1** Describe the country and its characteristics
- STEP 2** Identifying important sectors to the Ghanaian economy
- STEP 3** Identify sectors potentially vulnerable to international response measures
- STEP 4** Identify relevant response measures
- STEP 5** Assess the impacts of international response measures
- STEP 6** Look at possible domestic and international tools and support which may be needed to address the impacts
- Identifying Vulnerable Sectors
- Identifying Response Measures
- Assessing the Impacts



Reporting on the Impacts of Response Measures: Ghana Case Study

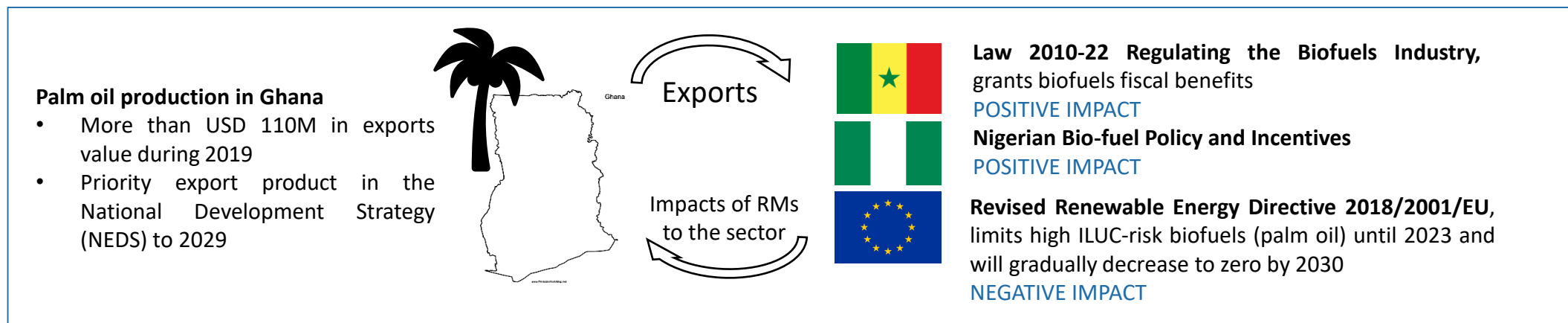
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Reporting on the Impacts of Response Measures: Ghana Case Study

- ERCST and the Environmental Protection Agency in Ghana have been working together on **identifying, measuring and analysing the impacts of the implementation of response measures in Ghana**
- To foster capacity building and stakeholder participation, virtual workshops are being organized at each stage of the development of the case study
- One of the main objectives is to **test, refine and improve the methodology** that ERCST has developed
- The research and information from this Informal Dialogue will be shared and will **feed into the discussions of KCI and the Forum** on response measures

Figure 1. Example of impacts of RM for palm oil sector in Ghana



Step 2-3 results

Table 1. Top 12 sectors ranked by Vulnerability Indicator

- Filtering process, from 71 to 12 sectors

| Sector Description | | GDP at Current Market Prices Gh¢ | Employment by econ. activity* | (1) GHG Intensity | (2) Trade Intensity | (3) Vulnerability Indicator |
|-----------------------------------|--|-------------------------------------|----------------------------------|-------------------|------------------------|--------------------------------|
| ISIC Rev 4 Code | Description | % of GDP | % of tot. workforce | kgCO2e/\$ | Indicator | (1)*(2) |
| 0127, 1073 | Cocoa | 1,35% | 26,86% | 2,624 | 1,70 | 4,449 |
| 0126 | Palm oil | 0,59% | 26,86% | 2,635 | 0,50 | 1,308 |
| 11, 10 (-1073, -1020) | Manufacture of beverages & food products | 2,64% | 7,95% | 0,545 | 0,51 | 0,280 |
| 03,1020 | Fishing | 0,93% | 0,09% | 0,419 | 0,54 | 0,226 |
| 0610, 0620, 1920 | Oil and gas | 4,55% | 0,03% | 0,100 | 1,82 | 0,182 |
| 05, 07 (- gold of 0729), 08,09 | Mining and quarrying without oil and gas and gold | 3,19% | 0,15% | 0,356 | 0,33 | 0,118 |
| 23 | Manufacture of other non-metallic mineral products | 0,95% | 0,21% | 0,103 | 0,46 | 0,048 |
| 2420, 0729 | Gold | 7,13% | 1,62% | 0,027 | 1,44 | 0,039 |
| 25 | Manufacture of fabricated metal products, except mach. and equip. | 0,85% | 0,52% | 0,009 | 0,50 | 0,004 |
| 22 | Manufacture of rubber and plastics products | 1,11% | 0,09% | 0,005 | 0,54 | 0,003 |
| 20 | Manufacture of chemicals and chemical products | 2,43% | 0,16% | 0,005 | 0,48 | 0,003 |
| WTO 1.33, 1.36 | Tourism (travel, and expenditure by main purpose of trip) | 2,77% | 3,70% | - | - | - |

Source: own elaboration based on GSS, ILOSTAT, BUR/NIR, UN Comtrade, UNWTO and other relevant sources for missing data points

*Data: ILOSTAT LFS (2017), employment by economic activity - ISIC level 2, Cocoa and palm oil under broad category ISIC 01 - Crop and animal production

For more info: <https://seureservercdn.net/160.153.137.163/z7r.689.myftupload.com/wp-content/uploads/2021/01/20210215-ERCST-Presentation.pdf>

Step 4.1 Identification of top trading partners vulnerable sectors

- Consists of 2 sub-steps, data from UNComtrade for 2019
- **Step 4.1.1** Identifying top 5 export partners per sector, took top export products (HS codes) representing 90% or more of the export category (Table 2)
- **Step 4.1.2** Adding up all values of the different sectors per country (Table 3)

Table 2. Step 4.1.1 - example for 2 sectors, step 4.1.1

| Product Description | | 2019 Top 5 Export Partners: Value (USD) | |
|---------------------|-------------|---|-------------|
| ISIC Rev 4 Code | Product | Country | Total Value |
| 0127, 1073 | Cocoa | Netherlands | 692482090 |
| | | Japan | 296652405 |
| | | USA | 246818388 |
| | | Malaysia | 230959617 |
| | | Germany | 159950759 |
| 0610, 0620, 1920 | Oil and Gas | China | 2376380429 |
| | | South Africa | 903373960 |
| | | India | 409213110 |
| | | USA | 370932192 |
| | | United Kingdom | 241901848 |

Source both tables: own elaboration based on UNcomtrade data

Table 3. Step 4.1.2 - total exports value for vulnerable sectors by country

| Country | Total value exports (USD) 2019 |
|---------------|--------------------------------|
| China | 2873710487 |
| Switzerland | 2377844886 |
| India | 2177621119 |
| South Africa | 1962260483 |
| UAE | 874624539 |
| Netherlands | 692482090 |
| USA | 617750580 |
| UK | 297704408 |
| Japan | 296652405 |
| Malaysia | 244118505 |
| Germany | 183809113 |
| Burkina Faso | 175336239 |
| Togo | 105760610 |
| Ukraine | 74903046 |
| Senegal | 60691742 |
| Sierra Leone | 54584994 |
| France | 41759247 |
| Benin | 28697224 |
| Niger | 24967406 |
| Belgium | 21775767 |
| Côte d'Ivoire | 20198406 |
| Nigeria | 19758763 |
| Mali | 14112268 |
| Brazil | 9599846 |
| Canada | 9140709 |

Step 4.2 Our definition of response measures and their impacts

Table 4. List of response measures, potential impacts and vulnerable sectors to each response measure

| Response measures | Impacts in country undertaking the response measure | Possible impacts in other countries | Sectors vulnerable (negative impacts) |
|--|--|---|--|
| Carbon taxes | decreased demand for carbon-emitting goods; increased demand for low-carbon emitting goods | Negative effects: fossil fuel producers, carbon-intensive goods producers. Positive effects: low-carbon goods producers (e.g., renewable energy/EV components) | crude oil, refined oil, natural gas, coal |
| Subsidies | | | |
| <i>for low-carbon transport</i> | decreased demand for goods associated with internal combustion engines. | Negative effects: producers of fossil fuels, lead. Positive effects: producers of EVs, cobalt, lithium, vanadium. | crude oil, refined oil, lead, conventional automobiles |
| <i>for low-carbon energy production</i> | decreased demand for thermal fuels | Negative effects: coal, natural gas, oil producers. Positive effects: low-carbon energy technology (e.g., PV solar cells) and inputs (e.g., steel and cement for wind turbines) | coal, natural gas |
| <i>removal of, for fossil fuel production</i> | decreased production of fossil fuels | Positive effects: fossil fuel producers, alternative tech producers. Negative effects: fossil fuel consumers. | crude oil, refined oil, coal, natural gas |
| <i>removal of, for fossil fuel consumption</i> | decreased consumption of fossil fuels | Negative effects: fossil fuel producers. Positive effects: fossil fuel consumers, alternative tech producers. | crude oil, refined oil, coal, natural gas |
| <i>for energy efficiency in buildings</i> | decreased energy consumption, increased employment in construction sector | Effects depend on fuel source used in implementing country buildings. If imported fossil fuels used, negative effects on foreign producers. | any fuel source used for residential and commercial heating: gas and coal |
| Green procurement | | | |
| <i>of energy</i> | decreased demand for thermal fuels, increased demand for low-carbon energy technologies | Negative effects: coal, natural gas producers. Positive effects: coal and natural gas consumers (price decrease), producers of alternative energy tech. | coal, natural gas |
| <i>of automobiles</i> | decreased demand for goods associated with internal combustion engines. | Negative effects: fossil fuel producers. Positive effects: cobalt, lithium, vanadium producers, EV producers. | crude oil, refined oil |
| Cap and trade schemes | decreased demand for carbon-intensive goods; increased demand for low-carbon goods | Depends on details of scheme, but possible: Negative effects: fossil fuel producers. Positive effects: renewable energy/low-carbon transport tech producers; fossil fuel consumers. | coal, natural gas, steel and associated products, aluminum, cement, basic plastics, nitrate fertilizers, high-GHG electricity, oil, pulp & paper and associated products |

Step 4.2 Our definition of response measures and their impacts

Table 4 (cont’). List of response measures, potential impacts and vulnerable sectors to each response measures

| Response measures | Impacts in country undertaking the response measure | Possible impacts in other countries | Sectors vulnerable (negative impacts) |
|--|---|--|---|
| Liberalization of trade in environmental goods | boost in consumption of green goods | Positive effects: producers of covered environmental goods | conventional competitors to liberalized green goods |
| Border carbon adjustment | decreased demand for high-carbon goods (aluminum, steel, cement, plastics, pulp & paper); increased demand for substitutes. | Depends on carbon intensity, and regime details, but likely: Negative effects: aluminum, steel, cement, plastics, pulp & paper. Positive effects for low-carbon producers. | steel and associated products, aluminum, cement, basic plastics, nitrate fertilizers, high-GHG electricity, oil, pulp & paper and associated products |
| Standards and labelling requirements | | | |
| <i>for agricultural goods, involving GHG intensity</i> | depends on details of the scheme, but likely loss of market share for non-certified air-frieghted goods, inter alia. | Depends on details of the scheme, but possible: Negative effects for producers of perishable fruits such as berries, high-value horticulture | air-freighted produce; agricultural goods that involve deforestation and/or high use of nitrate fertilizers |
| <i>mandatory efficiency performance standards for consumer goods, industrial equipment</i> | restricts the market to high-efficiency products; reduces demand for fuel | Negative effects: fossil fuel producers; producers of low-efficiency consumer goods and industrial equipment. Positive effects: fossil fuel cosnumers; producers of high-efficiency goods/equipment | white goods, machinery |
| <i>for basic materials, involving GHG intensity</i> | restricts the market to low-GHG intensity products in basic materials; reduces demand for fuel | Negative effects: depending on GHG intensity, may restrict market access for basic materials in metals, minerals, chemicals sectors | steel and associated products, aluminum, cement, basic plastics, nitrate fertilizers, pulp & paper and associated products |
| International aviation levies | n/a - international | Negative effects: flight-based tourism sectors (e.g., hotels, restaurants); producers of air-freighted (perishable) goods. | national airlines; hotels, restaurants, tour operators |
| International maritime levies | n/a - international | Negative effects: increased costs of imports and exports using maritime transport | sectors with high share of imported intermediate goods, capital goods; sectors that rely on maritime transport for export |

Source: ERCST Chile Case Study and modifications

Step 4.3 and 4.4 Matching response measures and selecting sources

- Two final steps needed before the final identification of response measures
- **Step 4.3** Matching response measures to sectors and countries identified in previous steps (Table 5)
- **Step 4.4** Selecting the sources and databases for the identification of the response measures (Table 6)

Table 5. Step 4.3 Examples of matching response measures to sectors and countries

| Country | Sectors | Type of RM searched for |
|--------------------|--|---|
| China | - Crude and refined oil - Fishing - M&Q without oil and gas and gold (aluminium and manganese) - Gold | - carbon taxes - subsidy for low carbon transport - removal of subsidy for fossil fuel production - removal of subsidy for fossil fuel consumption - subsidy for energy efficiency in buildings - green procurement for automobiles - CBAM - standards and labelling requirements for agri. goods involving GHG intensity - for basic materials involving GHG intensity |
| Switzerland | - Gold | -na |
| Germany | - cocoa - fishing - manufacture of fabricated metal products (iron and steel, aluminium) | - standards and labelling requirements for agri. goods involving GHG intensity - international maritime levies - international aviation levies - CBAM - standards and labelling requirements for basic materials involving GHG intensity |

Source: own elaboration based on previous data and Table 5

Table 6. Step 4.4 – selecting sources for identification of RM

| Sources |
|--|
| 1. EEA database |
| 2. OECD database |
| 3. NDCs |
| 4. WTO environmental database |
| 5. IEA Building Energy Efficiency Policy Database |
| 6. ICAP carbon market database |
| 7. FAOLex database |
| 8. Global Climate Legislation Database |
| 9. IEA/IRENA Joint Policies and Measures Database |
| 10. ITC Sustainability Map, Standards Map |
| 11. International Civil Aviation Organization (ICAO), CORSIA |
| 12. International Maritime Organization (IMO) |
| 13. UNFCCC Synthesis Report |
| 14. World Bank, Carbon Pricing Dashboard |
| 15. IEA Global EV Outlook |
| 16. Organic Export Info (funded by Switzerland) |
| 17. Relevant government websites |

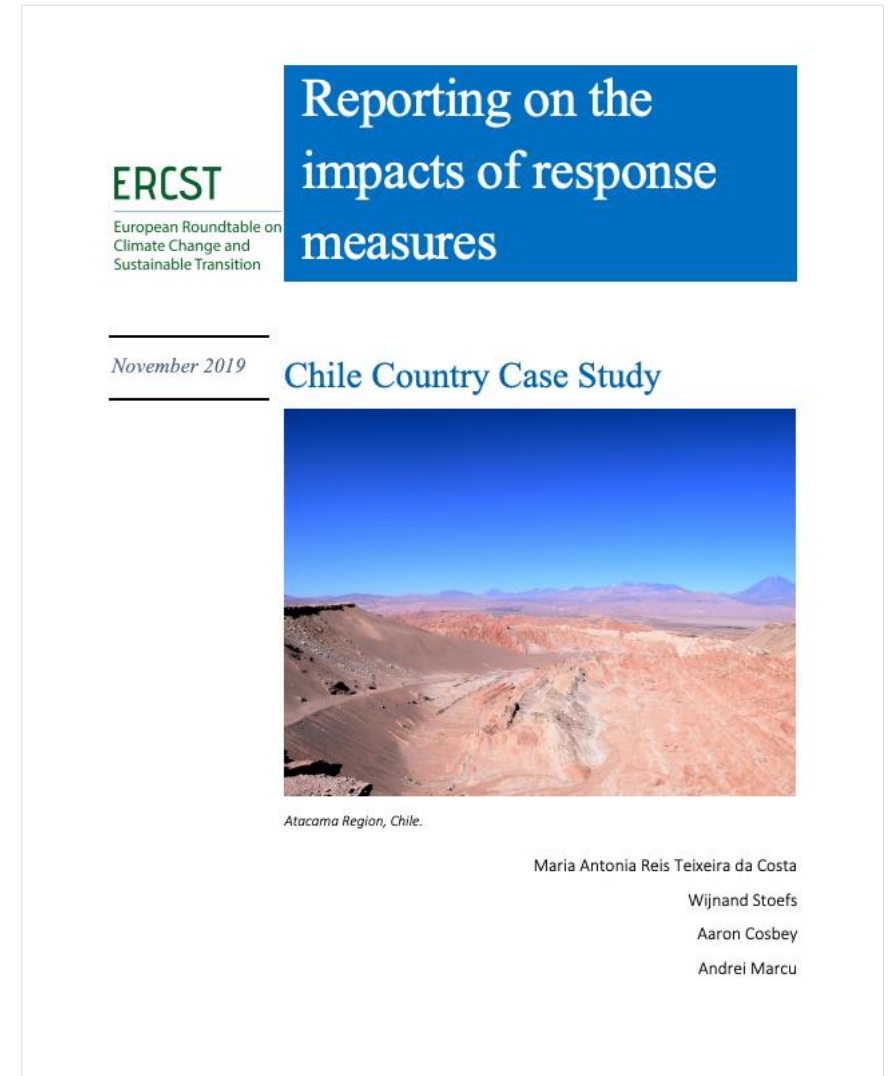
Source: ERCST Chile Case Study with modifications

Example Results Step 4

Table 7. Example of Step 4 results for Oil & Gas Sector (ISIC Rev 0610, 0620, 1920)
Top 5 export countries for the sector and identified response measures

| China | South Africa | India | USA | United Kingdom | International Transportation |
|--|---|--|---|---|---|
| NEV Programme China | Carbon Tax Bill | National electric car purchase subsidy and income tax deduction on loans. Phase II of Faster Adoption and Manufacturing of Electric Vehicles (FAME II) | Zero-Emission Program (ZEV) for (PHEV, BEV, FCEV) | UK carbon Price Floor | <ul style="list-style-type: none"> International Maritime Organization (IMO) and other shipping climate change related measures CORSIA/ICAO (for air freight) |
| National electric car purchase subsidy and exemption of purchase tax (10%) | Carbon dioxide vehicle emissions tax (2010) | National Electric Mobility Mission Plan (NEMMP) 2020 | CBAM (under consideration) | UK ETS | |
| Fuel economy standard for light duty vehicles | | Clean air standard | Tax reduction scheme for electric car purchase | United Kingdom (EV30@30 signatory) | |
| EV charging infrastructure policies | | National Mission on Transformative Mobility and Battery Storage | Transportation and Climate Initiative (TCI) ETS | National electric car purchase subsidy | |
| National ETS (started operating 2021) | | State Level policies supporting EV deployment and taxes on motor vehicles | US Electrify Forward Act (2020) | Considerations of a CBAM | |
| Subnational ETS Pilots | | Exploring options such as energy efficiency regulations and fuel diversification to reduce its oil import dependence by 10% in 2022 | Safer Affordable Fuel-Efficient (SAFE) Vehicles Rule for Model Years 2021–2026 Passenger Cars and Light Trucks, Corporate Average Fuel Economy (CAFE) standards (NHTSA/EPA, 2020) | Various incentives for Ultra Low Emissions Vehicles (ULEVs) | |
| Law on the Prevention and Control of Atmospheric Pollution | | | State level policies supporting the commercial deployment of alternative fuel vehicles and/or their supporting infrastructure | | |
| Energy Conservation Law | | | Oregon ETS (under consideration) | | |
| Subsidies for energy-saving automobiles | | | California's Low Emission Vehicles (LEV III) pollutant emissions and GHG regulations | | |
| China's 14th Five-Year Plan (14th FYP, 2021 to 2025) | | | California's e Innovative Clean Transit Regulation to reduce emissions from HDV and other state level initiatives for medium and heavy duty vehicles | | |
| China's 14th Five-Year Plan (14th FYP, 2021 to 2025) | | | Extension of federal tax credit on charging infrastructure 2019 | | |
| | | | State level charging infrastructure incentives | | |
| | | | California Cap and Trade Programme (CaT) | | |

Reporting on the Impacts of Response Measures: Chile Case Study



Example Results Step 8

IMO: Possible introduction of a CO2 Tax

Macroeconomic impacts

- IMO carbon tax in essence reduces the export prices received by producers by increasing transport costs.
- The expected overall GDP reduction is limited in for all three potential IMO carbon tax price levels:

| | 2020 | 2030 | 2040 | 2050 |
|-----------------------------------|---------|---------|---------|---------|
| Higher tax rate (50 USD/tonne) | -0.012% | -0.024% | -0.031% | -0.037% |
| Medium tax rate (30 USD/tonne) | -0.007% | -0.015% | -0.019% | -0.023% |
| Lower tax rate (15 USD/tonne) | -0.004% | -0.007% | -0.009% | -0.011% |

Example Results Step 8 (2)

ICAO: Upcoming introduction of CORSIA

Main direct impacts:

- Reduced spending by travellers in the retail sector
 - 15 EUR fare increase = -3,1 billion CHF
 - 30 EUR fare increase = -13,3 billion CHF
- Total of the direct effects across 60 sectors in model
 - 15 EUR fare increase = -6,81 billion CHF
 - 30 EUR fare increase = -29,28 billion CHF

Indirect impacts:

- Total reduced spending by travellers across 60 sectors in model in indirect impacts
 - 15 EUR fare increase = -4,58 billion CHF
 - 30 EUR fare increase = -19,71 billion CHF

Lessons of the past: Chilean Response Measures

Main Challenges:

- Availability of disaggregated sectoral data on GHG intensities, employment, value added
- Database approach to identifying relevant RMs: thousands of national, sub-national policies
- Quantification of impacts often difficult: no existing assessments; modelling challenging, requiring too many assumptions.

Lessons of the past: Chilean Response Measures (2)

- **Study provides significant step for developing detailed methodology for analysing RM**
- **Providing starting point + template for others to follow and adapt:**
 - Dependent on national circumstances, economic structure, key sectors, strength of institutions and engagement of stakeholders.
- **Fits BUR and BTR reporting**
- **Methodology describes data, time- and labour-intensive process**
- **Way to simplify methodology:**
 - Limit number of sectors that are deemed vulnerable;
 - Limit the number of response measures analysed;
- **Found that:**
 - Overall number of important domestic and international RM is:
 - Relatively limited
 - Concentrated in a limited number of sectors
 - Limited number of policies could impact many sectors (e.g. international transportation)



Thank you!

More information on our work on Response Measures: <https://ercst.org/tag/response-measures/>

Chile Case Study Report and Methodology: <https://ercst.org/reporting-on-the-impacts-of-response-measures/>

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