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CLIMTRADE

Economic impacts of climate regulation in trade

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CLIMTRADE was developed under the Ambition to Action project

The tool is an output of the Ambition to Action project, which supports NDC implementation through technical assistance and thought leadership. The second phase of the project is implemented collaboratively by NewClimate Institute and Xander van Tilburg, over a two-year period until March 2022. Project funding is provided by the International Climate Initiative (IKI) of the German Federal Ministry for the Environment, Nature Conservation, and Nuclear Safety (BMU). Ambition to Action's technical assistance aims to support the mainstreaming of climate and development goals at the sector level, through the development of evidence on social, economic and environmental benefits of mitigation actions and pathways.

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Supported by:
Federal Ministry for the Environment, Nature Conservation, Building and Nuclear Safety
based on a decision of the German Bundestag

INTERNATIONAL CLIMATE INITIATIVE (IKI)

clim trade

Detailed instructions and explanatory guidance to help use the **CLIMTRADE** model are included within the tool itself

A2A – Advancing from Mitigation Ambition to Action

2016-2019 / 2020-2022

- Project funded under German International Climate Initiative (IKI)
- Implemented by NewClimate Institute in cooperation with ECN/ TNO and Xander van Tilburg

Partner countries:

- Phase I (2016-2019): Argentina, Indonesia, Kenya, Thailand
- Phase II (2020-2022): Argentina, Indonesia, Kenya

CLIMTRADE

Methodology overview

Download here: CLIMTRADE

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Overview: Purpose and application

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Excel tool to quantify **economic impacts** resulting from carbon tariffs, e.g. CBAM

Partial equilibrium modelling based on World Bank model & **Input-Output** module

High level example questions:

- How does a carbon tariff applied to different commodities **impact export revenues of different countries?**
- How does **reducing the emission intensity** of a commodity (mitigation) constitute a **competitive advantage for exporting countries?**
- How does a carbon tariff-induced demand shock affect **domestic output and employment?**

Advantages:

- Manageable data requirements
- Transparent, accessible and adaptable
- Easy to implement
- Open source

Limitations:

- Snap shot analysis, no longitudinal modelling, no feedback effects
- No cross-product substitution / industry links
- Not a forecasting tool

Methodology

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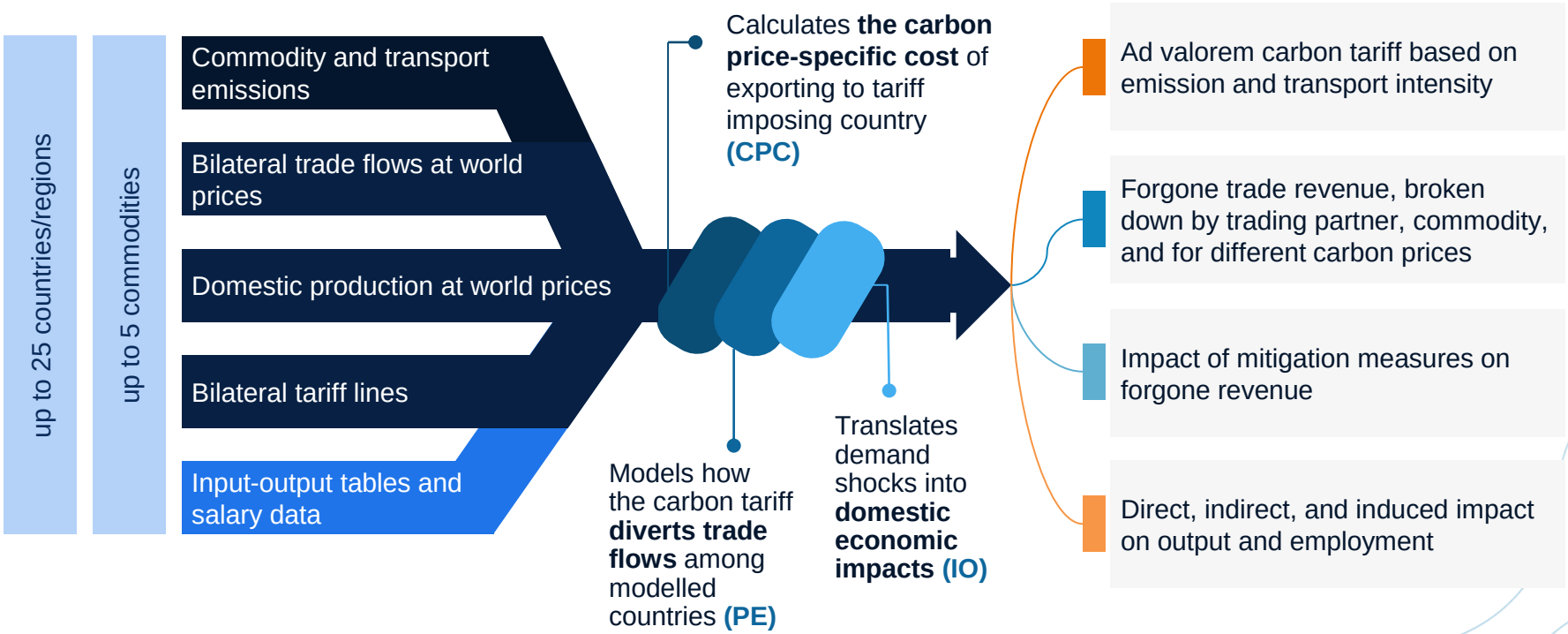

Carbon price specific cost (CPC)

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carbon price specific cost (CPC)
associated with a specific trade flow between exporting county and importing country

=

commodity and country specific emission intensity
kg CO2 per kg

+

transport emission intensity
kg CO2 per kg
Calculated by multiplying per km transport intensity estimate by (maritime) distance between countries

×

difference in importer and exporter carbon price
USD per kg

CPC (USD per kg traded) is then converted to ad-valorem terms using UNCTAD methodology

commodity and country-pair specific carbon tariff
%

=

carbon price specific cost (CPC)
USD per kg traded

÷

international price of commodity
USD per kg

×

100

Partial equilibrium model (PE)

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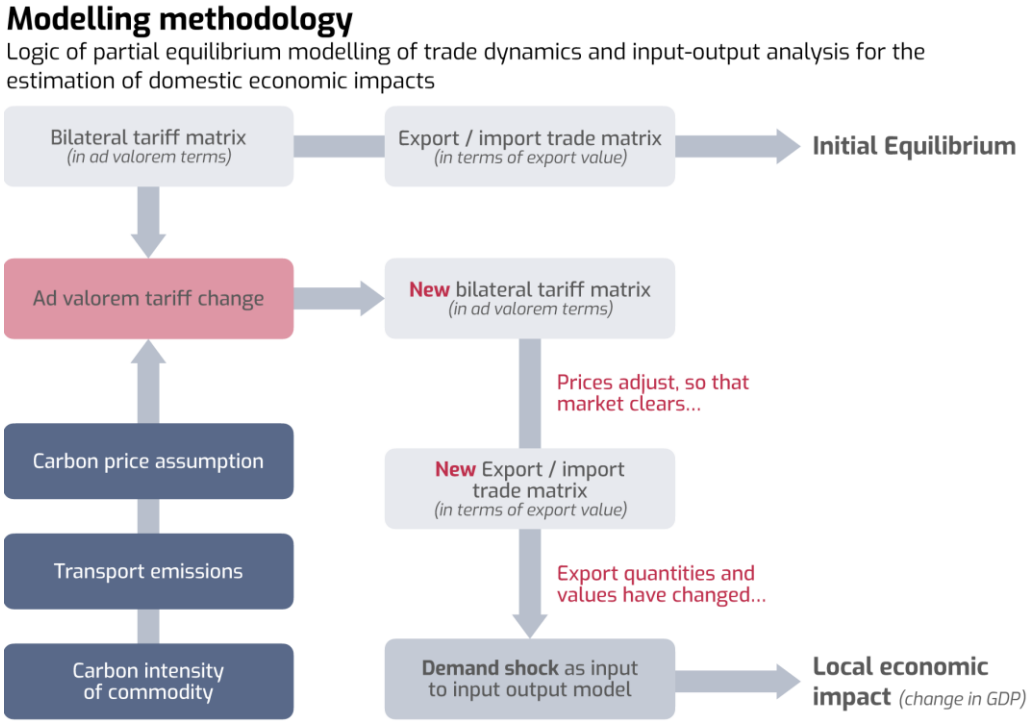
We model the introduction of a **carbon tariff** by exogenously defining a tariff increase for imported commodities.

The model solves by imposing **market clearing** (changing prices so that there is no excess supply or demand on the world market) to determine equilibrium prices and quantities imported and exported.

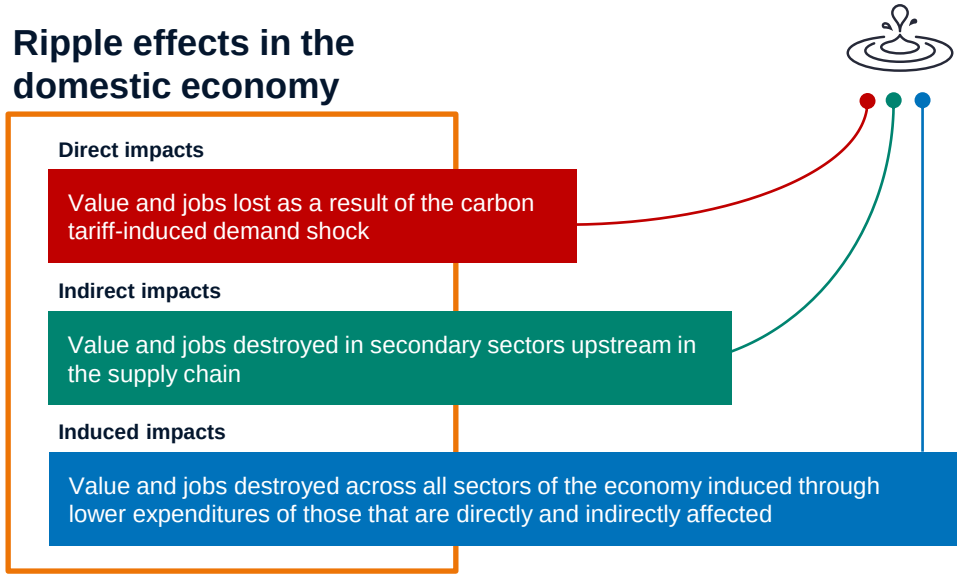
Please refer to [Francois & Hall (2009)] for a full derivation of **the partial-equilibrium model** on which CLIMTRADE is based.



Input-output analysis (IO)

- We use **input-output analysis** to estimate economic impacts (GDP and employment) countries facing forgone revenue resulting from the introduction of a carbon tariff.

Ripple effects in the domestic economy



Data requirements and sources

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Data requirements are **generally limited** (see table). All required input data and sources provided are open source.

CLIMTRADE has all OECD input-output tables **pre-loaded**.

Additional inputs required for the PE model are **elasticities** of substitution, import demand elasticities, and export supply elasticities. Default values, based on Francois & Hall (2009), are provided.

Data	Source
Domestic production data	E.g. FAOSTAT
Bilateral trade flows in monetary terms	World Integrated Trade Solution
Bilateral tariff data	World Integrated Trade Solution
World prices	E.g. GIEWS FPMA
Commodity emission intensities	E.g. Roser & Ritchie (2021)
Transport intensities	ECTA
Transport distances	Mayer & Zignago (2011)
Input-Output tables	OECD (2021)
Salary data	E.g. MTEySS (2020)

Note: Where general data sources are not available, sources used in the Argentina case study (see following slides) are provided as examples.

Example results: Argentina

Analysis of selected agriculture commodities in Argentina

More info: A2A Argentina

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Overview: Impacts across carbon prices

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Analysis of the impact of a **EU-wide carbon tariff on agriculture commodities** on Argentina's export oriented agriculture industry.

Analysis of 5 commodities, **modelled for 25 countries/regions**.

Commodity	USD 25 per tonne of CO_2eq	USD 50 per tonne of CO_2eq	USD 75 per tonne of CO_2eq	USD 100 per tonne of CO_2eq	
Soybeans (k USD)	$ -293,185	$ -579,895	$ -860,329	$ -1,063,460	PE module
Maize (k USD)	$ -34,533	$ -68,350	$ -101,478	$ -132,097	
Bovine meat (k USD)	$ -69,732	$ -139,791	$ -127,257	$ -114,398	
Wheat (k USD)	$ -9,485	$ -18,883	$ -28,195	$ -37,422	
Milk and cream (k USD)	$ -58	$-116	$ -157	$ -233	
Total forgone revenue (k USD)	$ -406,993	$ -807,036	$ -1,117,433	$ -1,347,610	
Total domestic impact (k USD)	$ -916,240	$ -1,817,961	$ -2,467,919	$ -2,947,261	IOT module
Impact on total GDP (%) (2019)*	-0,2%	-0,4%	-0,6%	-0,7%	
Impact on agricultural GDP (%) (2019)**	-4,0%	-7,9%	-10,7%	-12,8%	
Impact on employment (job years)	-20,247	-40,159	-55,153	-66,248	

Trade diversion: Cuts in exports to the EU

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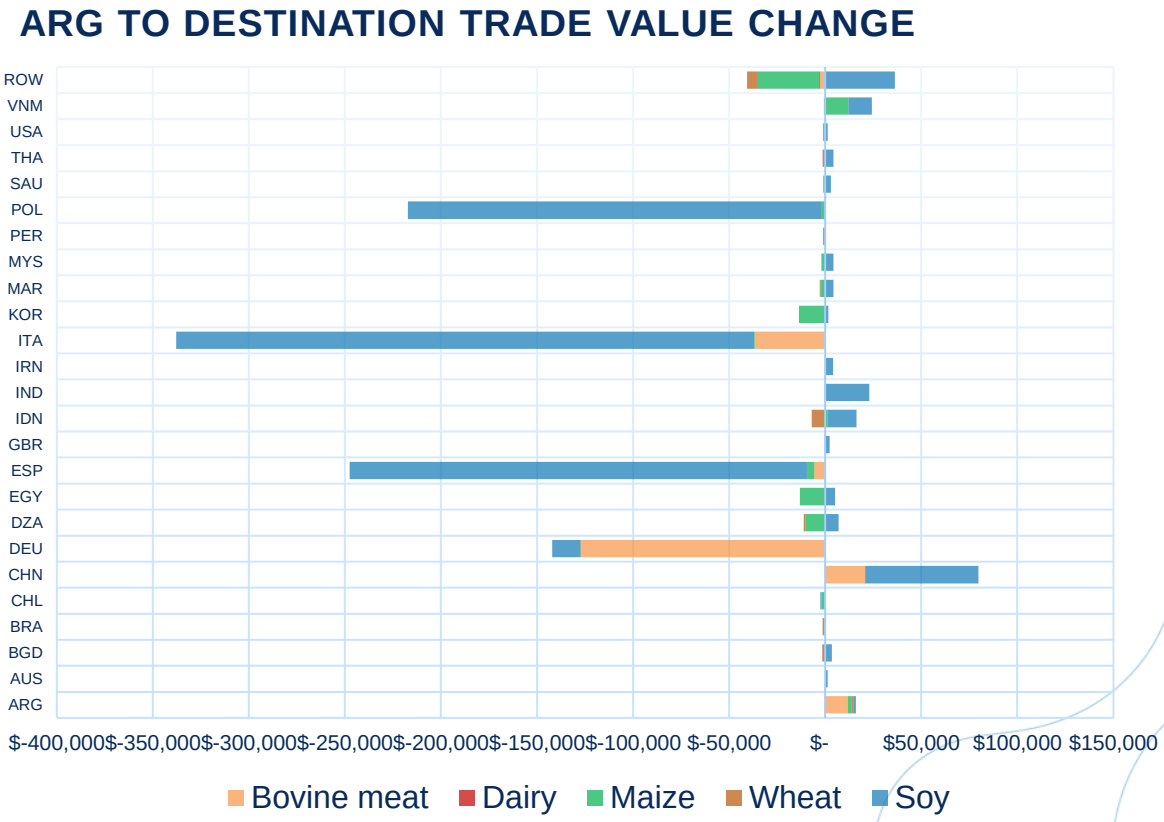
Trade diversion effects from the perspective of Argentina, as a result of a EU carbon tariff based on a **USD 50 per tCO2 carbon price.**

Significant **forgone export revenue** from cuts in EU demand for soy and meat.

Increased exports to China and India only **partly offset forgone revenue**.



Mitigation: Emission intensity reduction

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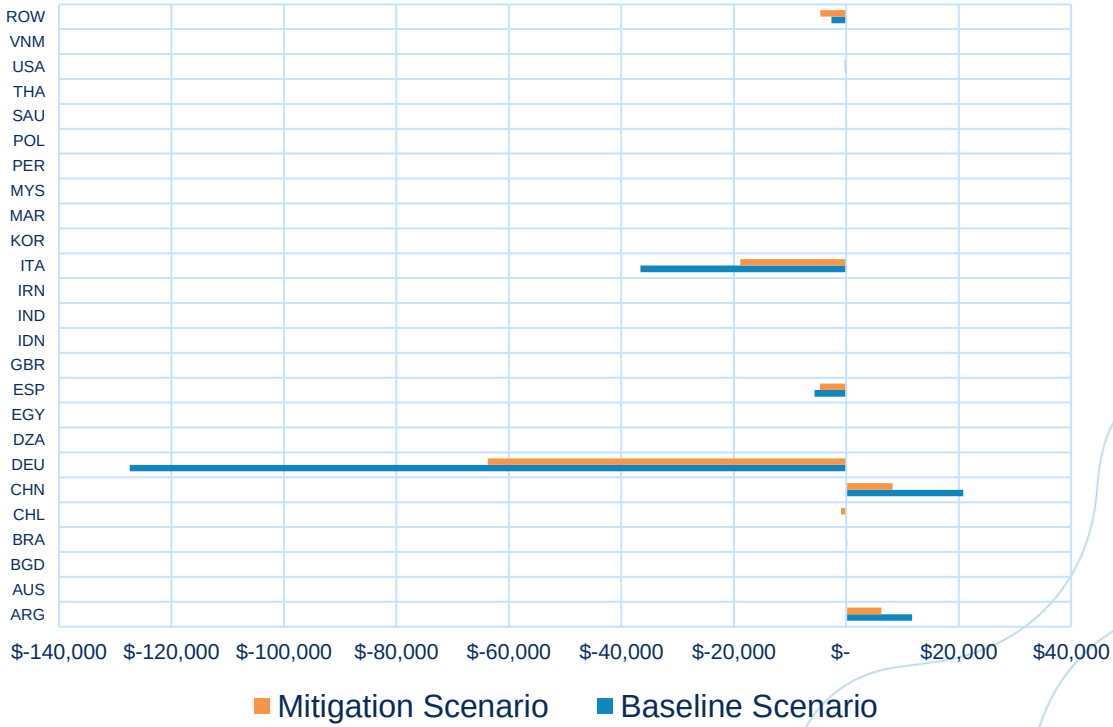
Baseline and **mitigation scenario** comparison, assuming a USD 50 per tCO2 carbon price.

The mitigation scenario assumes a **30% reduction in the emissions intensity** of bovine meat production in Argentina.

Total forgone revenue in baseline scenario: **USDm 139.8**

Total forgone revenue in mitigation scenario: **USDm 78.8**

Change in ARG's Bovine meat Export Flows



Domestic impacts: GDP and jobs

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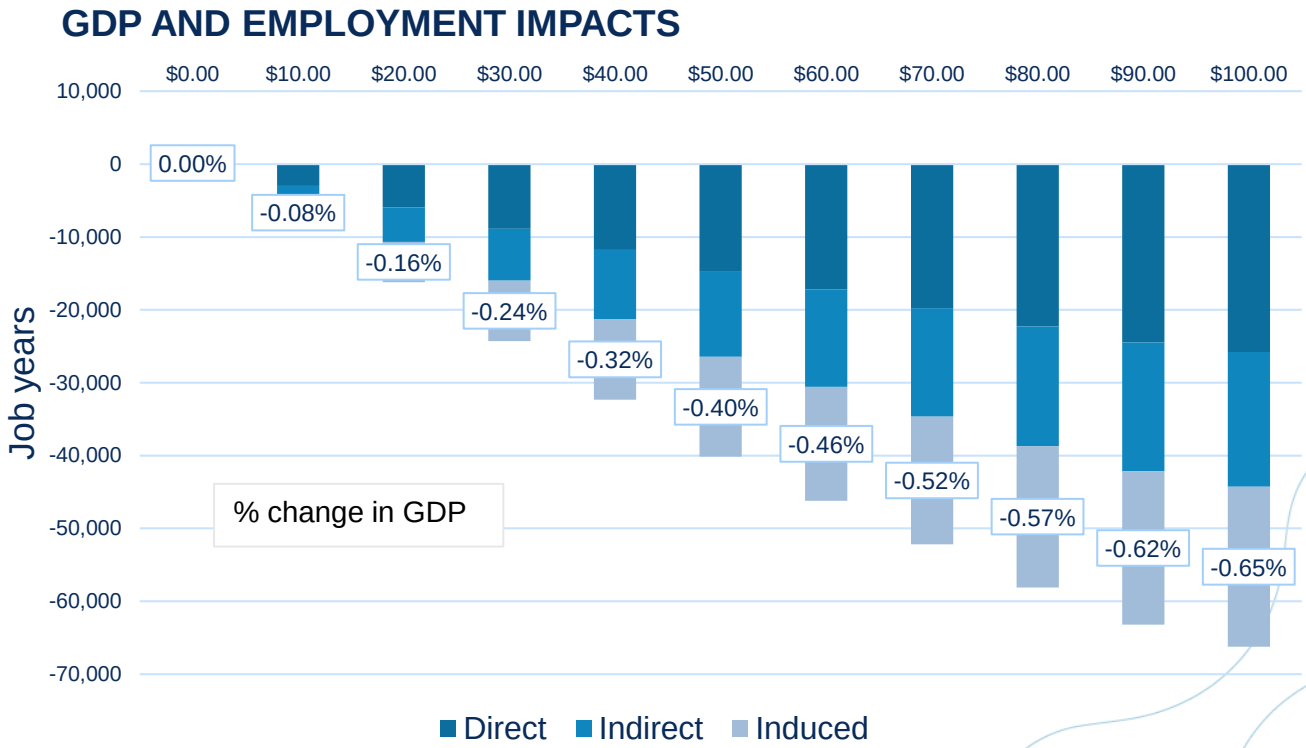
Input-output analysis capturing direct, indirect, and induced **GDP** (label) and **employment** (y-axis) impacts for different **carbon prices** (x-axis).

Aggregated results for all commodities modelled.



Thank you

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