Emission Trading Based on National Emission Pathways Calculated with the Regensburg Formula

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Contents

1. What the Regensburg Model is it good for

2. How it works

3. Some results of the model

Current Situation

- At the 2010 Cancun Conference, the 2°C target for global warming was agreed on.

- Global warming caused by humans is mainly due to CO_2 emissions.

- The IPCC estimates the <u>cumulative amount</u> of CO_2 emissions compatible with the 2°C target since pre industrial time to be about 2.900 Gt.

IPCC, 2013: Summary for Policymakers. In: Climate Change 2013: The Physical Science Basis. Contribution of Working Group to the Fifth Assessment Report. p. 27.

Agreement on a CO_2 Emission Budget

- The 2°C target without a CO_2 budget doesn't make any sense.

- An explicit agreement on a budget is not on the political agenda.

- The 2015 Conference in Paris is a good chance to negotiate a CO_2 budget, because the required investments in new infrastructure and products need time for preparation.

Options for Implementing a CO_2 Budget

1. <u>CO_2 reduction offers</u> by countries: If the sum is higher than the budget (ambition gap), new offers are made.

2. <u>Worldwide CO_2 tax</u>, which is contiously adjusted until the budget is met (standard-price-approach).

3. <u>Dividing up the CO_2 budget</u> amoung countries.

Premise of the Regensburg Model

➢ The distribution of emission rights should result in national pathways.

➢ The national pathways should be fair and economically reasonable.

➢ Flexibility and cost effiency should be ensured by introducing emission trading between countries.

Two steps of the Regensburg Model

1. Global emission pathway – Excel-Tool

- A global emission pathway must be within the limitations of the global CO_2 budget.

- We offer an Excel-tool to determine reasonable pathways.

2. National emission pathways – Regensburg Formula

- National emission pathways are derived from the global pathway.

- Starting point are the national emissions in the base year.

- Climate justice is reached gradually.

- Emission trading between countries is enabled.

Input Variables

Global emission pathway
1. Global emission budget (620 Gt).
2. Global emissions in base year (43 Gt).
3. Global emissions in target year (4.3 Gt).
4. Parameters to determine the trajectory.

National emission pathways
5. National emissions in base year.
6. National population size in target year.

CO$_2$ Budget 2020–2050

	Gt	Source
Total budget	**2.900**	IPCC report (probability 66%)
− Emissions until 2011	1.890	IPCC report
− Emissions 2012–2019	324	Own estimation (growth rate 1.5%)
− Emissions after 2050	66	Own estimation (reduction rate 3%)
= **Budget 2020–2050**	**620**	

Global Emission Pathways
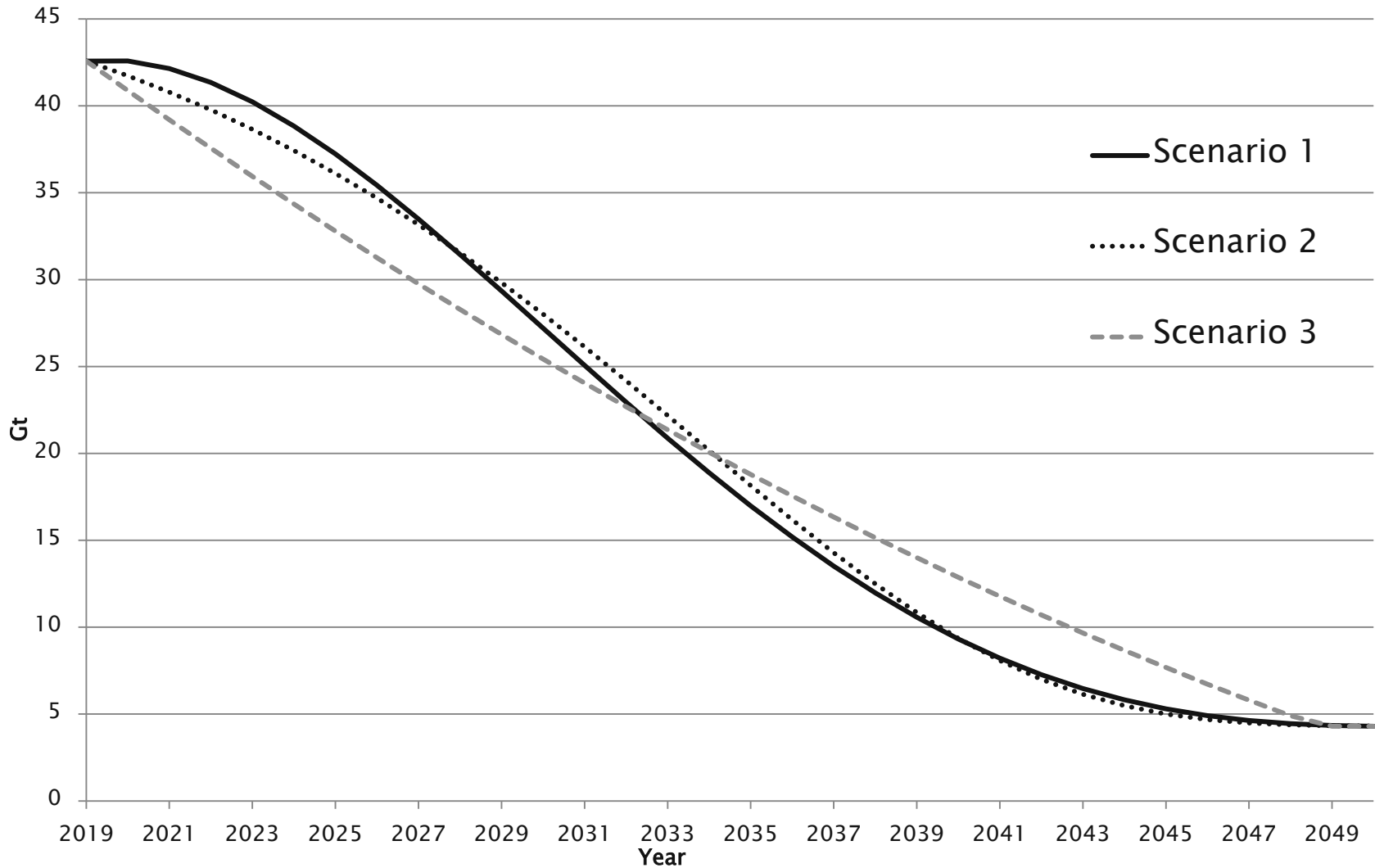
The Regensburg Formula

National emission pathways

$$E_t^i = E_{t-1}^i + CR_{t-1} * (E_{t-1}^i - TE^i)$$

Where
E_t^i = national emissions of country i in year t
TE^i = national emissions of country i in target year
CR_t = change rate in year t

Change rates result from the global emission pathway

$$CR_{t-1} = \frac{E_t - E_{t-1}}{E_{t-1} - TE} = \frac{\text{amount by which emissions are reduced in year t}}{\text{amount of emissions which remains to be reduced}}$$

Where:
E_t = global emissions in year t
TE = global emissions in target year

Gradual Climate Justice
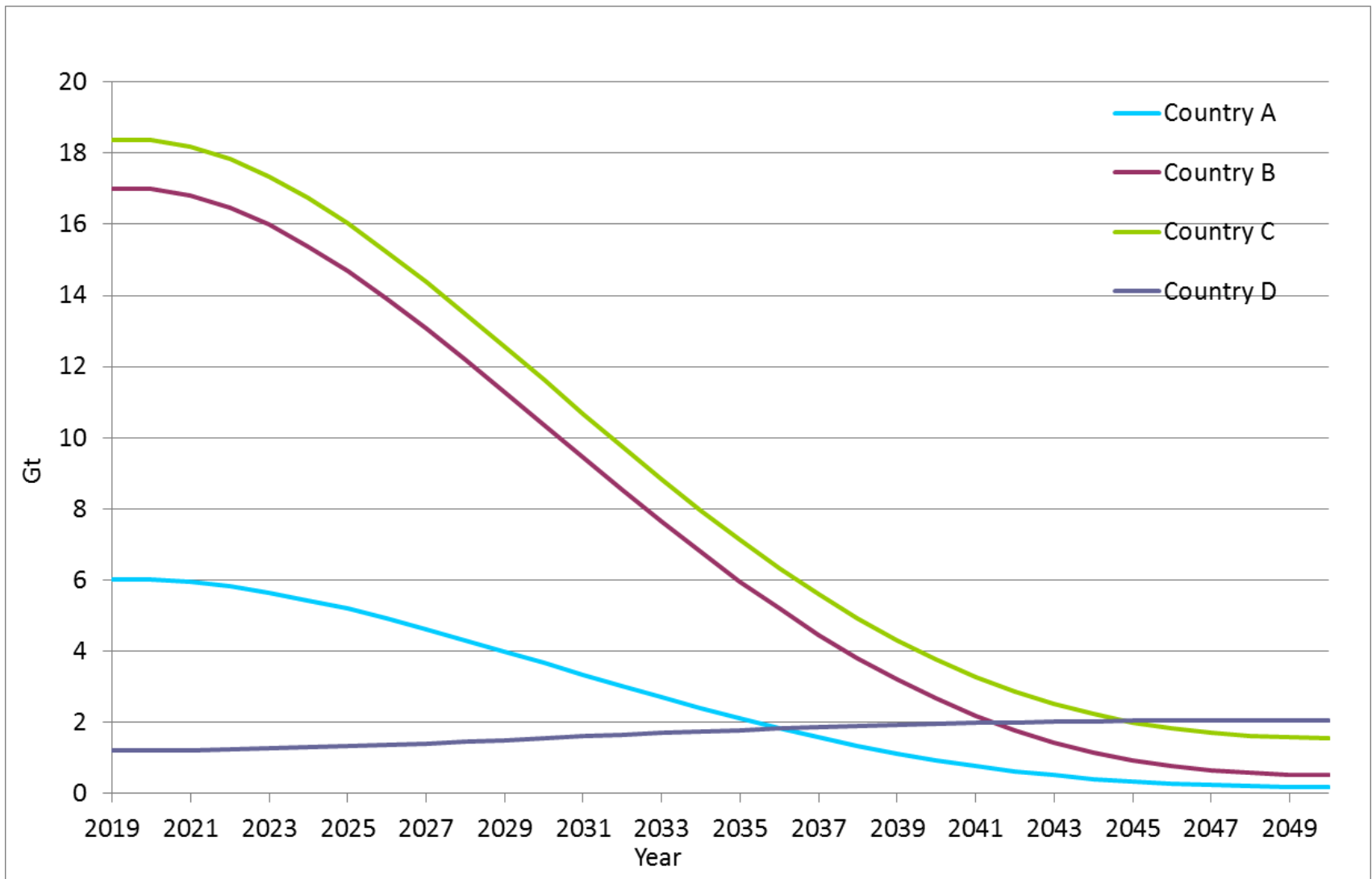
"One man – one emission right" is reached by

$$\frac{TE^i}{TE} = \frac{P^i_{ty}}{P_{ty}} => TE^i = P^i_{ty} * \frac{TE}{P_{ty}}$$
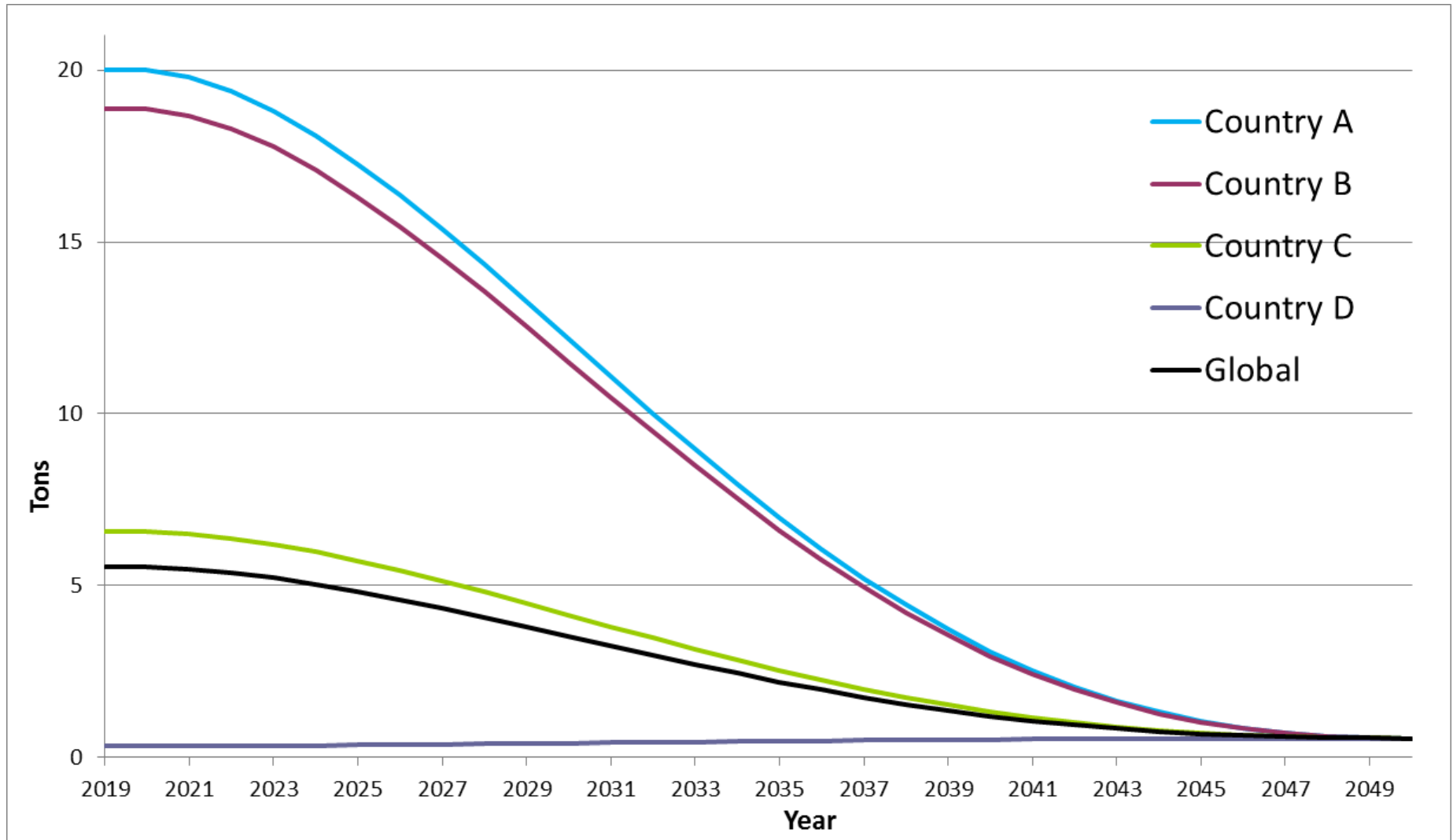
Where:

$\dfrac{TE^i}{TE}$ = national share of emissions in target year (ty)

$\dfrac{P^i_{ty}}{P_{ty}}$ = national share of population in target year

National Emission Pathways without Emission Trading (sc. 1)

National per capita Emissions without Emission Trading

Regensburg Formula with Emission Trading

National emission pathways

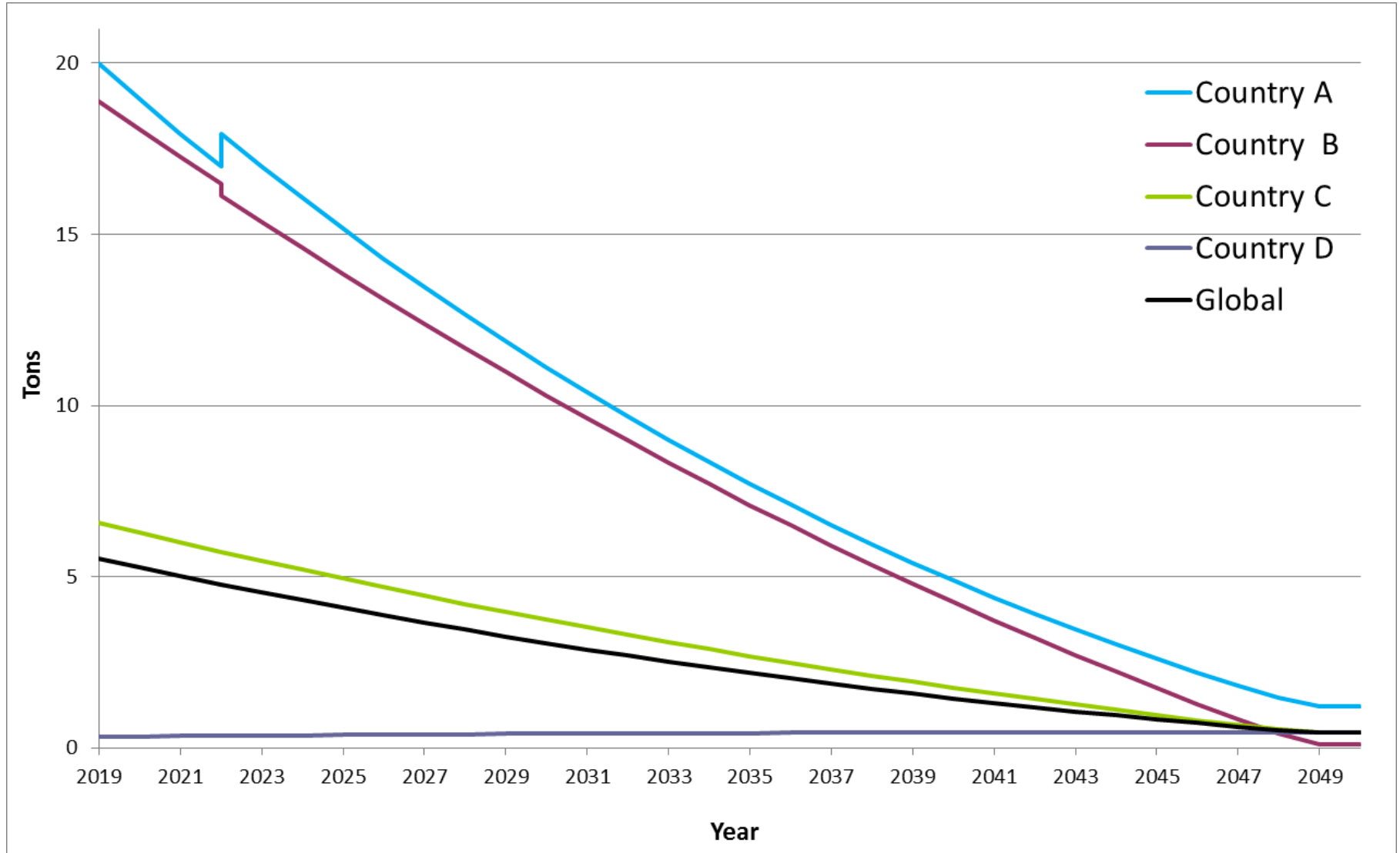$$E_t^i = E_{t-1}^i + CR_{t-1} * (E_{t-1}^i - TE_{t-1}^i) + \boldsymbol{T_t^i}$$

Target emissions

$$TE_t^i = TE_{t-1}^i + T_t^i$$

Where

T_t^i = amount of certificates bought/sold by country i in year t

National per capita Emissions with Emission Trading

Required Political Decisions

1. Agreement on global CO_2 budget

2. Agreement on global emission pathway

3. Agreement on reaching climatic justice gradually

4. Sanctions for not keeping the national pathway

5. Regulations for emission trading

Thank you for your attention !

Download tool and more information:

www.save-the-climate.info