



# Developed Country Further Emissions Reductions: What is “Comparable Effort”?

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## What is “comparable effort”?

- Bali Action Plan on mitigation efforts for developed countries:

“Measurable, reportable and verifiable nationally appropriate mitigation commitments or actions, including quantified emission limitation and reduction objectives, by all developed country Parties, while ensuring the comparability of efforts among them, taking into account differences in their national circumstances;

- Basic idea: equal treatment of equal countries = countries in similar circumstances should make similar contributions
- Questions:
  - » How similar are developed countries?
  - » What national circumstances should we take into account?
  - » How to account for differences in past and future?



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## What is “comparable effort”?

- No single indicator is likely to be used in assessing comparable effort
- Key is for people to feel comfortable that each country’s contribution is “fair”
- Important to add more details/information to shape/educate the debate
  - » Avoid a purely arbitrary process, while recognizing that numbers aren’t likely to provide “the answer”
- Workgroup of the Future Actions Dialogue formed to evaluate further Annex I targets, evaluating:
  - » Qualitative indicators of “comparability”
  - » Quantitative results of a set of indicators
- This presentation reflects the input to date



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## Indicators for Considering Comparability

- Two overarching frameworks (MNP/ECOFYS report):
  - » **Equal effort:** based upon country’s sharing the effort according to a defined indicator or set of indicators (e.g., equal % reduction or equal cost).
  - » **Equal endpoint:** the effort of each country is based upon achieving the “same state in the future” (e.g., equal emissions intensity per sector).
    - could be based upon meeting the same state in the target year or based upon some level of progress in the target year
- Combinations or hybrids of the two are also possible



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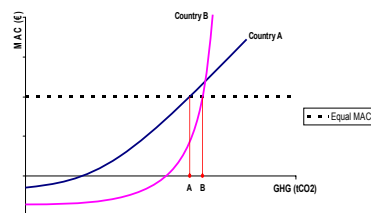
## Equal Effort Indicators

- Equal % reduction of emissions from base year
  - » Difference in past efforts + future trends are not considered
  - » Differences in mitigation potentials / costs are not considered
- Equal % reduction below a reference scenario
  - » Difference in past efforts + mitigation potentials / costs not considered
  - » Requires agreement on method for developing reference scenario
- Equal abatement costs
  - » Requires agreement on method for developing reference scenario
  - » Requires agreement on MAC curves / modeling



## Equal Effort (2)

- Equal marginal abatement costs
  - » Requires the knowledge of and agreement on countries' MAC curves.
  - » Because MAC curves are derived from costs based on current lifestyle, behaviour, etc., the approach ignores possible future changes.
  - » Accounts for differences in national circumstances
  - » Doesn't account for the total cost of reductions that might even include possible gains for initial reductions.



## Equal Effort (3)

- Equal total abatement costs per GHG reduced (€/tCO<sub>2</sub>eq.)
- Equal total abatement costs per (current) GDP
  - » Captures the differences in the “shape of a countries MAC curve”
  - » Partly accounts for the ability to pay (e.g., size of the economy)
- Equal total abatement costs per capita
- Equal macroeconomic effort
  - » Takes account of the abatement cost and also the impact of those costs on the performance of the economy
- Abatement costs in year x as percentage of GDP in year x

## Equal Endpoint Indicators

- ⇒ Each of these could either be achieved in the next compliance period (e.g., 2020) OR
- ⇒ In the next period (e.g., 2030) with defined progress made in the next compliance period.
- Equal per capita emissions at an endpoint
- Achieving equal efficiency levels per sector
  - » Based upon convergence of large number of sectors
  - » High level of data requirements
- Achieving the same economy-wide intensity (GHG/GDP)

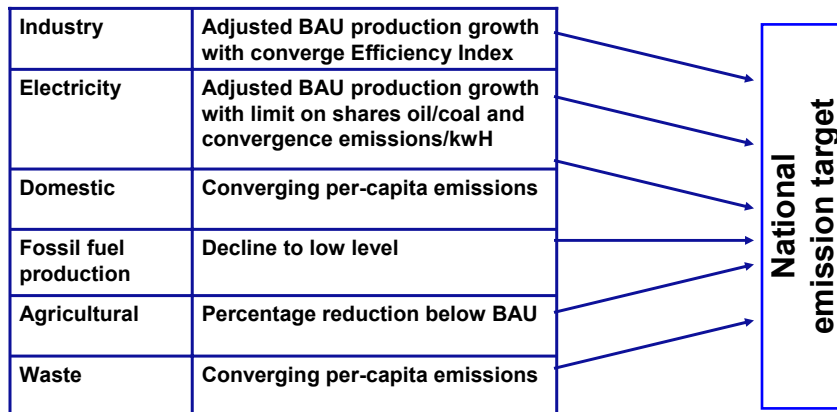
## Equal Endpoint Indicators (2)

- Multi-criteria approach:
  - » based on a combination of energy efficiency (emissions per unit of GDP), equity (emissions per capita) and the ability to pay (GDP per capita).
  - » No reference scenarios or MAC curves needed
  - » Ignores limiting factors like the availability of renewable energy resources, climatic differences, historically grown sectoral spreads, etc.
- Special type of multi-criteria convergence: Triptych approach
  - » Separate convergence of indicators according to the electricity, industry, “domestic sectors” (e.g., transportation), and other sectors.
  - » Based upon meeting the same technological level in key sectors (e.g., industry)
  - » High level of data requirements



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## Triptych approach



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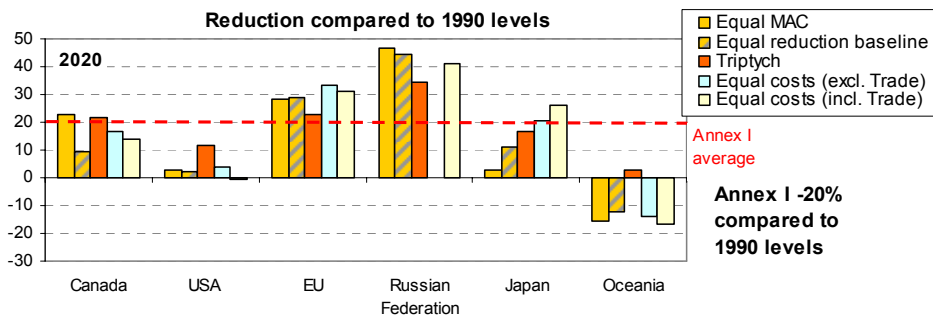
## Some Preliminary Results

- Analyzed 4 indicators (to date) using the FAIR model (MNP-analysis, see draft paper):
  - Equal marginal abatement costs
  - Equal % reduction below a reference scenario
  - Triptych approach
  - Equal abatement costs as percentage of GDP in year 2020 (no trade)
    - Equal abatement costs as percentage of GDP in year 2020 (with trade)
- Based upon Annex I as a whole reducing emissions to 20% below 1990 levels
  - » More aggressive A1 efforts considered in the future.



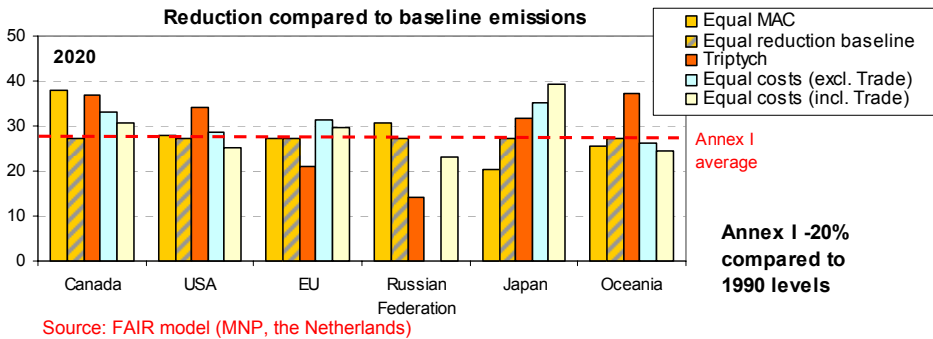
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## Reduction Compared to 1990 Levels



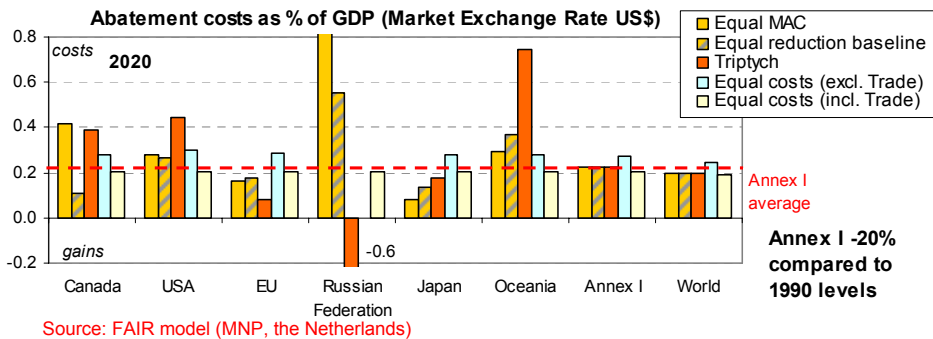
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# Reduction Compared to BAU



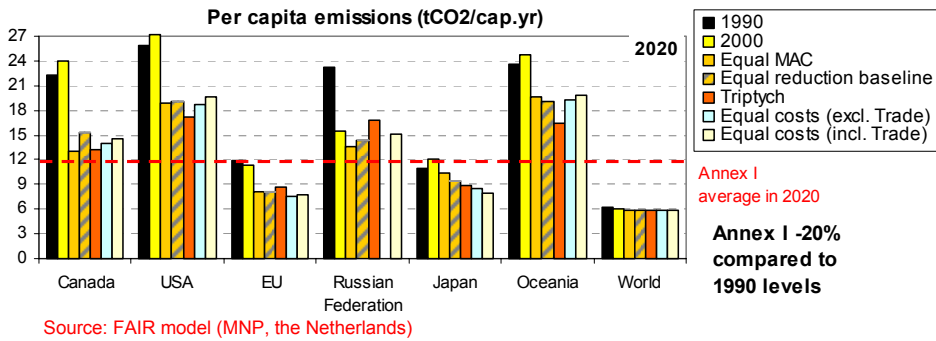
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# Abatement Costs as % of GDP



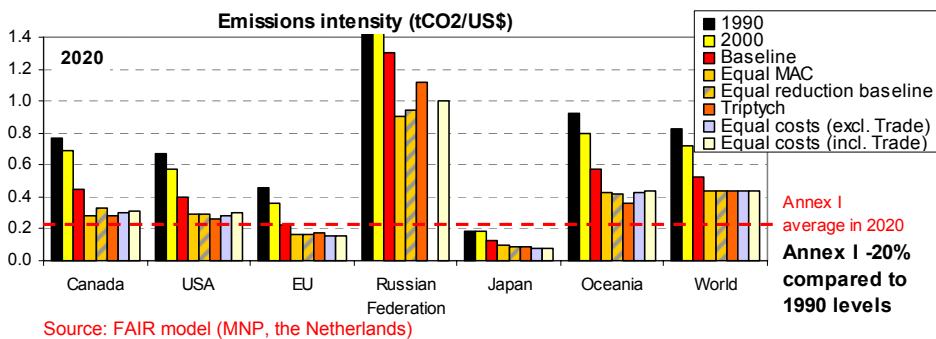
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# Per Capita Emissions



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# Emissions Intensity per GDP



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# Conclusions

- Many indicators potentially available to assess “comparability”
  - » Each has pros and cons
  - » **BUT** adding a bit of “data” will inform the debate and will help narrow down the differences
- Under preliminary quantitative results (compared to reference and 1990 levels)
  - » Wide range of reductions for Annex I countries
    - 25-40% compared to reference emissions
    - 15% above to 45% below 1990 levels
  - » The Russian Federation and the EU have the greatest reductions below 1990 levels
    - Similar reductions from reference emissions in some cases
  - » USA has the lowest reductions compared to 1990 levels (5% growth to -15% compared to 1990 levels)—significantly below A1 avg.
    - Compared to reference rate, approaches A1 avg. in most cases



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# Conclusions: Preliminary Results...

- » Canadian reductions at A1 avg. compared to 1990 levels under eq. MAC and Tripytch, below A1 avg. under other scenarios
  - Greater reductions than A1 avg. compared to reference in all indicators
- » Japan reductions compared to reference vary significantly (~3% to 27% reduction from 1990 levels)
  - Around or above A1 avg. reduction from reference case under most indicators
- » Oceania (Aus & New Zealand) have growth compared to 1990 levels
  - Modest reductions below reference (approaches the Annex I average under Tripytch)
- Still wide variation in per capita emissions
  - » Highest in Oceania and the US
  - » EU lowest, followed by Japan
- Still variation in emissions intensity, but a bit of convergence?



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## Next Steps and Key Questions

- Provide more details on key assumptions (e.g., emissions, population, GDP, and some insights on cost curves) in Fair model.
  - » Will your country experts review/comment upon the underlying assumptions for your country?
- Analyze additional indicators of comparability
  - » Which ones are the most interesting for the next round?
- Analyze more aggressive A1 overall targets (e.g., 30 and 40% below 1990 levels)
- Analyze different cost curves
  - » Ask other modelers to conduct analysis of the same indicators to compare and add to the robustness of the debate?
  - » Workshop in the fall to present these findings?



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## References

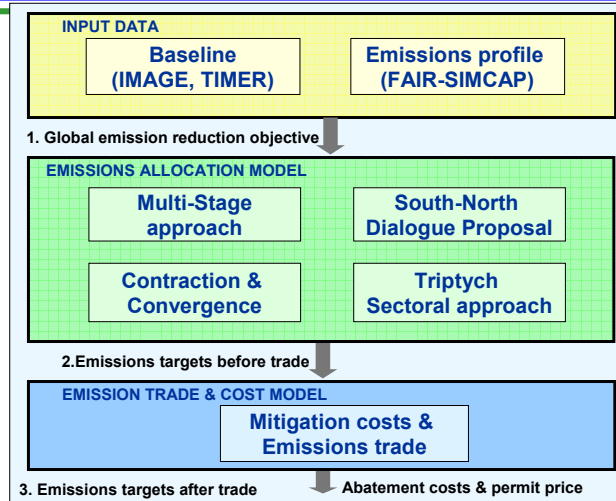
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MNP. Den Elzen, M.G.J and J. van Vliet, 2008. Analysis of Comparable Post-2012 Efforts for Annex I Countries.



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# The FAIR model (MNP): to analyse post-2012 climate mitigation regimes



Source: FAIR model (MNP, the Netherlands)



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