Measuring GHG emissions: the challenge of transboundary allocation

WS 4 of "Measuring Sustainability in tourism – Opportunities and limitations"

Picture source: https://en.wikipedia.org/wiki/Geography_of_Switzerland

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Program of the workshop

- 11.00: Opening words (Paul Peeters)
- 11.05: Measuring national emissions, TSSA approach (Lisa)
- 11.15: Introduction to transboundary allocation (Paul Peeters)
- 11.30: 4 work groups (one per allocation system)
- 12.10: Plenary feedback (5 minutes per sub-group for presentation and discussion)
- 12.30: End of workshop



DIW ECON Presentation





Assessment of tourism GHG emissions using the Tourism Sustainability Satellite Account (TSSA)

Workshop "How to measure tourism-related greenhouse gas emissions – The challenge of transboundary allocation"

Berlin, 3. April 2019



Sources: Linking the TSA and the EEA



- 1. German Tourism Satellite Account (TSA)
 - TSA has been produced repeatedly by DIW Econ and partners on behalf of the Federal Ministry for Economic Affairs and Energy.
 - It measures the impact of tourism on the economy (e.g. value added and employment).
- 2. Environmental-Economic Accounts (EEA)
 - Published by the Federal Statistical Office
 - Containing data on:
 - o GHG emissions by branches of production
 - o Direct and indirect CO2 emissions of final use of products



Two approaches for calculating tourism GHG emissions

Approach I: TSSA		Approach II				
	Calculation of the GHG emissions from a production perspective		Calculation of tourist CO2 emissions from a consumption perspective			
	GHG emissions of production activities that take place in German tourism industries		Direct and indirect emissions through the final use of goods and services in the economy			



Approach I: Calculating tourism GHG emissions

Step 1	Calculating GHG emission intensity by branch of production	<u>GHG emission by branch of production (t CO2e)</u> Production value by branch of production = Emission intensity by branch of production
Step 2	Calculating total GHG emissions by industry	$\sum_{i=1}^{98} Emission intensity by branch of production_{i} \left(\frac{t \ CO2e}{production \ value} \right) *$ $Production \ value \ of \ branch \ of \ production_{i} \ in \ industry_{x}$ $= GHG \ emissions \ for \ industry_{x} \ (t \ CO2e)$
Step 3	Calculating tourism induced GHG emissions by industry	Industry GHG emissions *Tourism share of industry value added = Industry's tourism induced GHG emissions (t CO2e)



Approach I: Preliminary results for 2015

		Tourism Industries									
	Unit	Accommodation and food service activities	Land transport and transport via pipelines	Water transport	Air transport	Rental and leasing activities	Travel agency, tour operator & other reservation service activities	Creative and cultural, gamb- ling, sports, amusement & recreation act.	Other touristic activities	Other	Comparison: German industries as a whole
Share in total tourism GVA (TSA)*	%	79.8%	18.9%	6.0%	69.7%	2.4%	88.9%	45.2%	9.6%	1.1%	3.9%
Management											
Social dimension											
Economic dimension											
Environmental dimension											
GHG emission intensity (industry total)	t CO2 equ / production value	0.00003	0.00020	0.00097	0.00100	0.00001	0.00001	0.00004	0.00004	0.00016	0.00015
GHG gas emissions (industry total)	Mt CO2 equ	3.0	20.2	26.9	26.9	0.4	0.2	2.4	36.0	742.6	858.6
GHGgas emissions (tourism related)	Mt CO2 equ	2.4	3.8	1.6	18.8	0.0	0.2	1.1	3.4	8.4	39.7
Share in total GHG emissions	%										4.6%
Distribution of tourism GHG emissions	%	6.1%	9.6%	4.0%	47.3%	0.0%	0.4%	2.7%	8.7%	21.2%	100%

* Share of value added induced by the demand of tourists.



Approach II: Calculating tourism CO2 emissions



CO2 emission by commodity group (t CO2) Private consumer spending by commodity group = Emission intensity by commodity group

Emission intensity by commodity group

- ** Tourist consumer spending by product*
- = Tourists' CO2 consumption by product (t CO2)

Economy's Tourism share of Tourists' CO2 Commodity group's Tourist consumer CO2 economy's CO2 emission intensity spending consumption consumption consumption t CO2/euro consumer Mt CO2 Mt CO2 % Million euro Measuring unit spending Accommodation services a) Conventional accommodation 0.0002227 35,823 7.98 b) Permanent use and letting by owners 0.0000466 3,634 0.17 Food and beverage serving services 0.0002227 51,241 11.41 Rail transport services 0.0003022 4,428 1.34 Public and other transport services 0.0003022 13,730 4.15 0.0016546 Water transport services 1,546 2.56 Air transport services 29.97 0.0013702 21,870 Rental and leasing services of motor vehicles 0.0000660 1,647 0.11 0.0000660 0.82 Travel agency and tour operator 12,408 Sporting, recreation, arts and entertainment services 0.0001194 31,115 3.71 Human health services 0.0001105 6,464 0.71 Foodstuffs 0.0002901 3.88 13,391 Motorcar fuel (indirect) 0.0002924 20,786 6.08 0.0002312 Other goods 58,309 13.48 10,815 Other services 0.0001331 1.44 87.81 Total indirect 857.49 10.24%

Approach II: Preliminary results for 2015

Motorcar fuel (direct)	0.0019386	20,786	40.30		
Habitation (direct)*			2.10		
(e.g. through the use of heating fuel, coal, or gas)					
Total direct			42.39	217.70	19.47%
Total			130.20	1,075.19	12.11%
* Use of different calculation method.					



Conclusion

Approach I: TSSA

- Production perspective
- Focus is on GHG emissions that arise from the activities of German tourism industries
- Information helps
 - to identify important tourism industries in terms of their contibution to GHG emissions,
 - to track changes over time,
 - policymakers

Approach II: outlook

- Consumption perspective
- Contributes additional information
 - Covers direct CO2 emissions associated with final use of products (e.g. burning of fuels) and
 - indirect CO2 emissions associated with production of products along the entire value chain
- CO2 emissions only



Outlook

Exemplary calculations of GHG emissions within our TSSA concept show that

- German tourism industry contributes a significant share to total GHG emissions
- of particular importance are GHG emissions associated with transport

□ There are different data sources for GHG / CO2 emissions:

- They differ regarding the allocation of GHG emissions, esp. related to cross-border transport
- Our calculations are based on the resident concept covering GHG emissions by domestic legal entities of the tourism industry, but not all GHG emissions that are induced by tourists in Germany
 - → e.g. emissions of non-domestic airlines that operate / take-off / land in Germany are not accounted for



Contact



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the consulting company of DIW Berlin

Thank you for your attention!

Introduction to transboundary allocation

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Picture source: https://en.wikipedia.org/wiki/Environmental_movement

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About measuring and allocating

- Measuring emissions are:
 - -Objective
 - -Scientific
 - -Unambiguous
- •Allocating emissions:
 - -Subjective
 - -Political
 - -Ambiguous



Paris versus Tourism's emissions





Some shares and modal split 2015



How can tourism become 'climatically sustainable'? (PhD), Delft University of Technology, Delft.



Growth of transport and emissions



Source: Peeters, P. M. (2017). *Tourism's impact on climate change and its mitigation challenges. How can tourism become 'climatically sustainable'?* (PhD), Delft University of Technology, Delft.



The basic CO₂ problem for Germany

 Aviation will consume up to 100% of Paris budget for all of Germany -This includes efficiency improvements -based on 1990-2016 average growth



International climate policy

- Paris agreement 2015
 - National Determined Contributions: for each country a dedicated reduction goal for 2030; reach zero emissions by 2050; reductions between 1990 and 2030:
 - o EU: 45%
 - o Germany: -55%
 - o Netherlands: -49%
 - NDC's cover: all road, rail and domestic air/water transport, all accommodation and all energy-consuming tourist activities
- ICAO covers international emissions
 - Aircraft CO₂ emissions standard per 2023 (effect 1-2%)
 - CORSIA carbon offsetting for >2020 additional emissions (airlines) To whom should *international air and maritime* emissions be allocated?



Allocation transboundary tourism emissions

- It depends on the goal of the measurement!
- The four measurement & allocation systems:
 - *1. National TSSA approach*: all direct national emissions related to all tourism activities within Germany
 - *2. International German tourists approach*: all emissions caused by tourists with German nationality all over the world (domestic plus international)
 - *3. International German businesses approach*: All emissions caused by Germany-based tourism businesses all over the world (domestic plus international)
 - *4. National NDC + bunkers approach*: all NDC-covered tourismrelated emissions within Germany plus international bunker fuels tanked at German airports and harbours



Allocation issues (excl. aviation)

- Kinds of tourists
 - Domestic
 - Inbound (foreigners)
 - Outbound (Germans abroad)
- Tourism emission sources:
 - Accommodation & hospitality in Germany or abroad
 - Tourism activities (museums, Lunaparks, etc.) in Germany or abroad
 - Car/rail/coach transport within Germany or abroad and by Germans or foreigners



Allocation issues (aviation)

- Domestic flights within Germany
- Arriving flights to German airports
- Departing flights from German airports
- Flights overflying Germany (e.g. Amsterdam to Vienna) with Germans or foreigners
- Flights taken by Germans abroad (e.g. within China)
- Kinds of passengers:
 - German passengers
 - Foreign passengers
 - Transfer passengers



Criteria

- Simple and easy?
 - (1=very difficult; 5=very easy)
- Does it help to allocate in a fair and equitable way?
 - (1=very unequal/unfair; 5=very equal and fair)
- Effective for reduction?
 - (1=very ineffective; 5=very effective)
- Easy implementation international aviation?
 - (1=easy to implement; 5=difficult to implement)
- Low costs?
 - (1=high cost; 5=low cost)
- Risk of double- or non-counting?
 - (1=high risk; 5=low risk)
- Emissions allocated to those with decision power to reduce?
 - (1=not at all; 5=fully)





Workshop instructions (40 minutes)

- Discuss the understanding of the workshop and the allocation system: what is included, excluded, how measured (10 min)?
- Decide for what purposes the system can be used (10 min). Purposes like 'comply to the Paris Agreed reductions', 'informing tourists', 'informing tourism businesses', 'allocate carbon costs to ...', etc.
- Score the system on the list of criteria (previous slide; 10 min)
- Write four 'pitches' about your system (5 min):
 - The topic and its relevance
 - Opportunities
 - Limitations
 - Action required











Summary of workshop 4

Paul Peeters, Breda University of applied sciences

To replace the background: press the right mouse button and select 'format background'. In the menu you can select an image from a file.

An exact fitting image has an aspect ratio of 16:9 - 960x540 pixels, or 1440x810 pixels for a higher quality.

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TSSA



TSSA

 German residents
 German businesses
 NDC+bunk ers

- Tourism sustainable satellite analysis; Germany based business.
- Opportunities: set industry targets; also covers inbound
- Limitations: German airline flights outside Germany. Only few countries have TSA.
 - Action: extend TSA approaches in the world



German residents



- German tourists
- Opportunities, Budgets traded
- Limitations: difficult to implement, detailed info,
- institution, indirect
- change. Regulation better
- Action: int. institution



German businesses



- Businesses responsible but countries through legislation
- Opportunities: like it because international corporations are 'carbon enabled'
- Limitations: scopes; complex for tour operators
 - Action:



NDC plus bunkers



- NDC plus bunkers
- Opportunities: rather easy
 - Limitations: not in line with individual responsibilities.
 Burden for big hubs. Equity.
 Action: incl. int bunkers in ndc



All schemes



