



# Global Challenges Doctoral Centre (GCDC)

## Hangout

## Climate Change as a Global Challenge

**Dr Frank Grundig**

**Deputy-Director, Global Challenges Doctoral Centre**

# My research interests

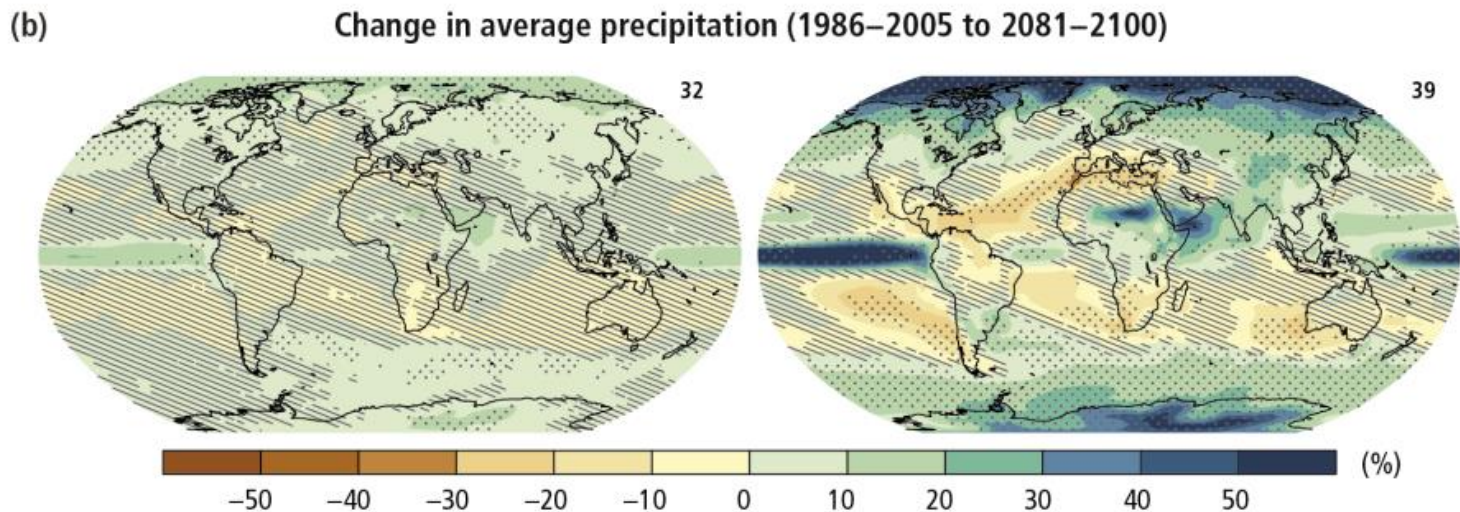
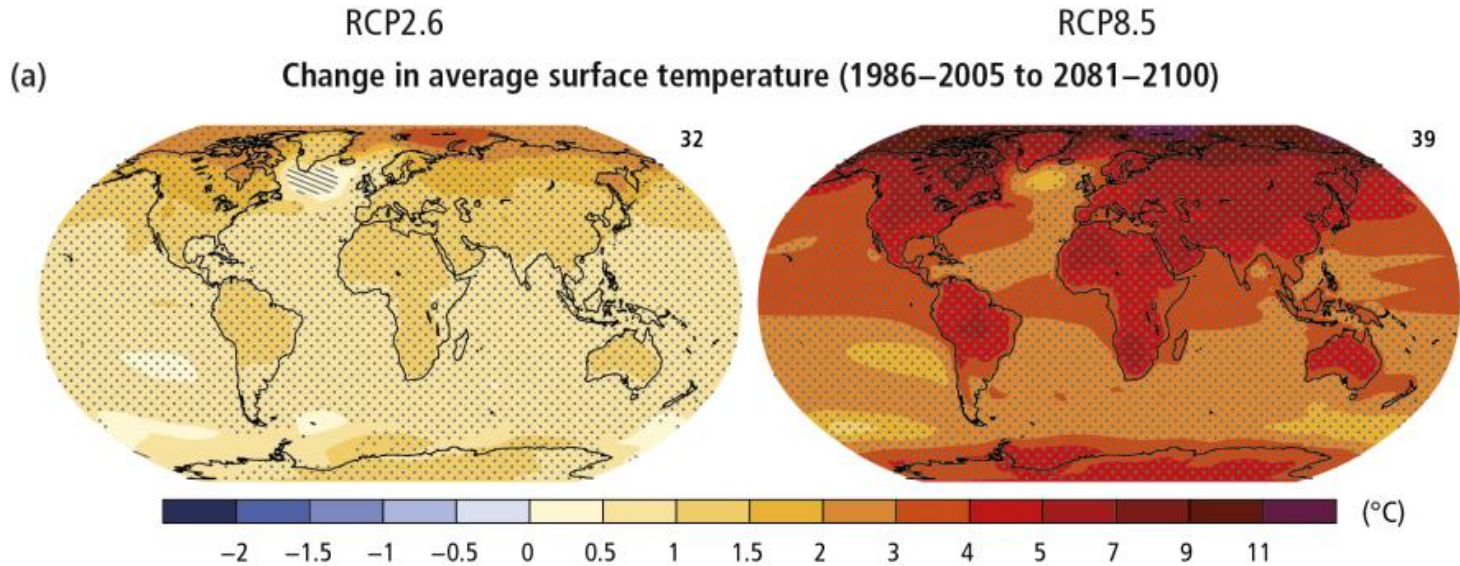
- International cooperation
  - International climate change institutions (e.g. Paris Agreement, UNFCCC) and their effectiveness
  - Role of power / leadership on effectiveness
  - Wider effects of international climate institutions
- Climate change mobilisation
  - Special interest groups, NGOs
  - Peru, Ecuador
- Climate change policy attitudes
  - Endorsements, information effects
  - Thailand, Malaysia

# A Bit About You



- Your name
- Your School/discipline/research topic
- Are you engaged in the climate change issue either through your work / research or privately?

# Climate change is a global challenge



# Global climate risk index

Table 1: The 10 most affected countries in 2018

Ranking 2018 (2017)	Country	CRI score	Death toll	Deaths per 100 000 inhabitants	Absolute losses (in million US\$ PPP)	Losses per unit GDP in %	Human Development Index 2018 Ranking <sup>12</sup>
1 (36)	Japan	5.50	1 282	1.01	35 839.34	0.64	19
2 (20)	Philippines	11.17	455	0.43	4 547.27	0.48	113
3 (40)	Germany	13.83	1 246	1.50	5 038.62	0.12	5
4 (7)	Madagascar	15.83	72	0.27	568.10	1.32	161
5 (14)	India	18.17	2 081	0.16	37 807.82	0.36	130
6 (2)	Sri Lanka	19.00	38	0.18	3 626.72	1.24	76
7 (45)	Kenya	19.67	113	0.24	708.39	0.40	142
8 (87)	Rwanda	21.17	88	0.73	93.21	0.34	158
9 (42)	Canada	21.83	103	0.28	2 282.17	0.12	12
10 (96)	Fiji	22.50	8	0.90	118.61	1.14	92

PPP = Purchasing Power Parities. GDP = Gross Domestic Product.

Table 2: The Long-Term Climate Risk Index (CRI): The 10 countries most affected from 1999 to 2018 (annual averages)

CRI 1999-2018 (1998-2017)	Country	CRI score	Death toll	Deaths per 100 000 inhabitants	Total losses in million US\$ PPP	Losses per unit GDP in %	Number of events (total 1999–2018)
1 (1)	Puerto Rico	6.67	149.90	4.09	4 567.06	3.76	25
2 (3)	Myanmar	10.33	7 052.40	14.29	1 630.06	0.83	55
3 (4)	Haiti	13.83	274.15	2.81	388.93	2.38	78
4 (5)	Philippines	17.67	869.80	0.96	3 118.68	0.57	317
5 (8)	Pakistan	28.83	499.45	0.30	3 792.52	0.53	152
6 (9)	Vietnam	29.83	285.80	0.33	2 018.77	0.47	226
7 (7)	Bangladesh	30.00	577.45	0.39	1 686.33	0.41	191
8 (13)	Thailand	31.00	140.00	0.21	7 764.06	0.87	147
9 (11)	Nepal	31.50	228.00	0.87	225.86	0.40	180
10 (10)	Dominica	32.33	3.35	4.72	133.02	20.80	8

# Climate Change and SDGs

- SDG 13 - Climate Action
- Climate change affects other SDGs
- Trade-offs and synergies

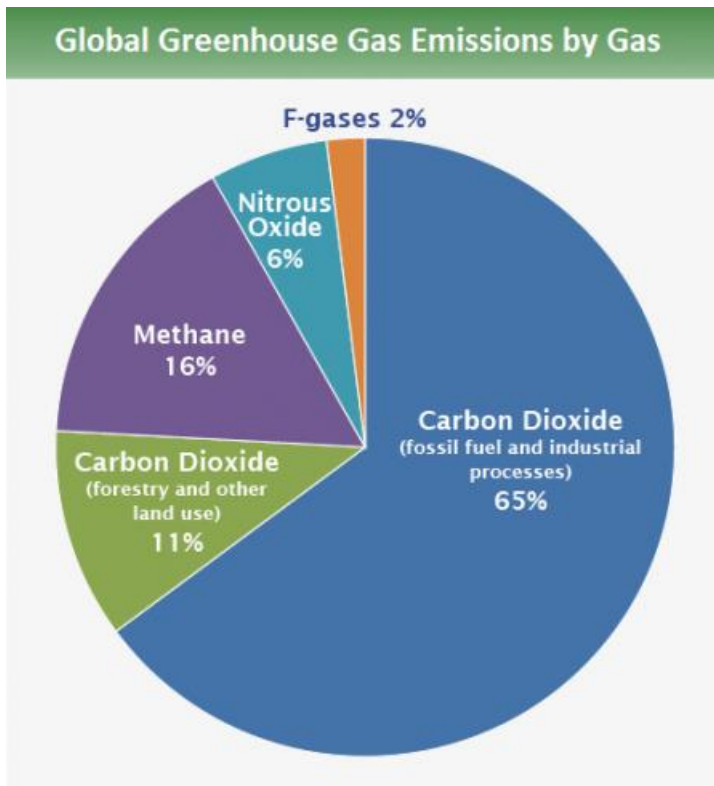
## Sustainable Development Goals



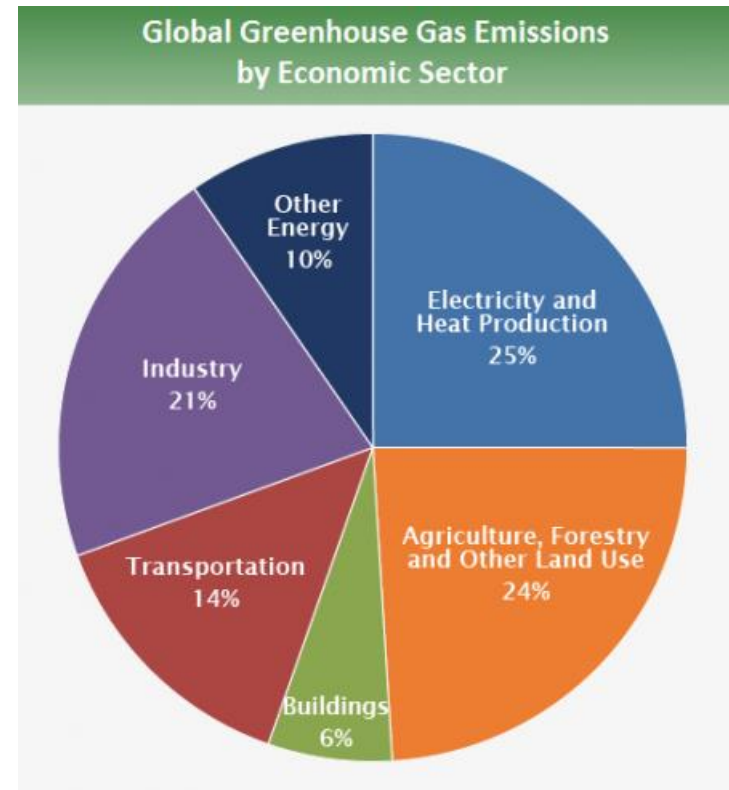
# A multi-sectoral challenge

- Global climate change is almost certainly man made.
- Almost certainly caused by rising GHG emissions

## Emissions by greenhouse gas



## GHG emission by sector

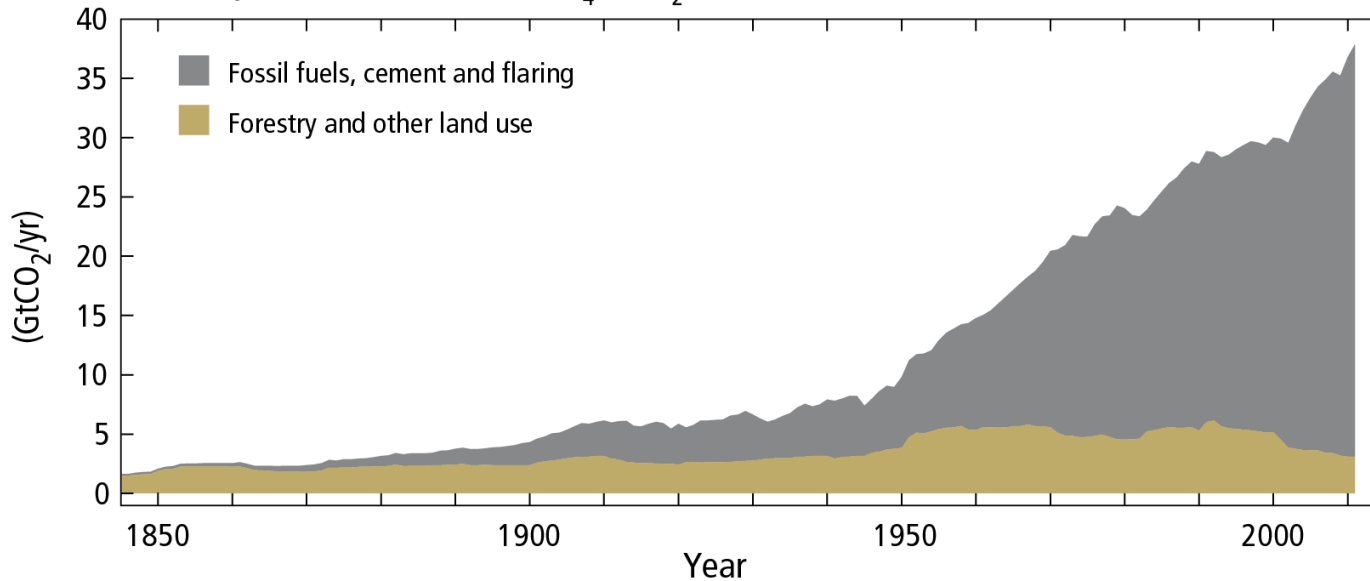




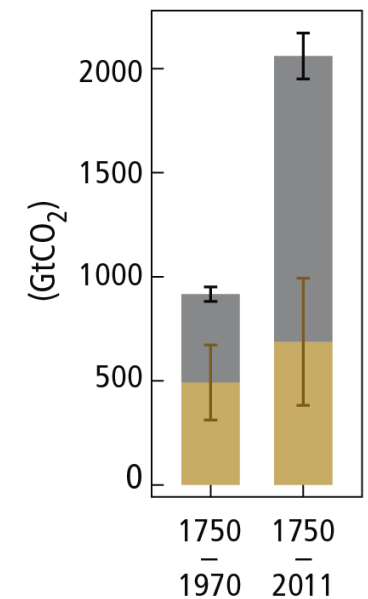
# Global climate change: CO<sub>2</sub> emissions

## Global anthropogenic CO<sub>2</sub> emissions

Quantitative information of CH<sub>4</sub> and N<sub>2</sub>O emission time series from 1850 to 1970 is limited

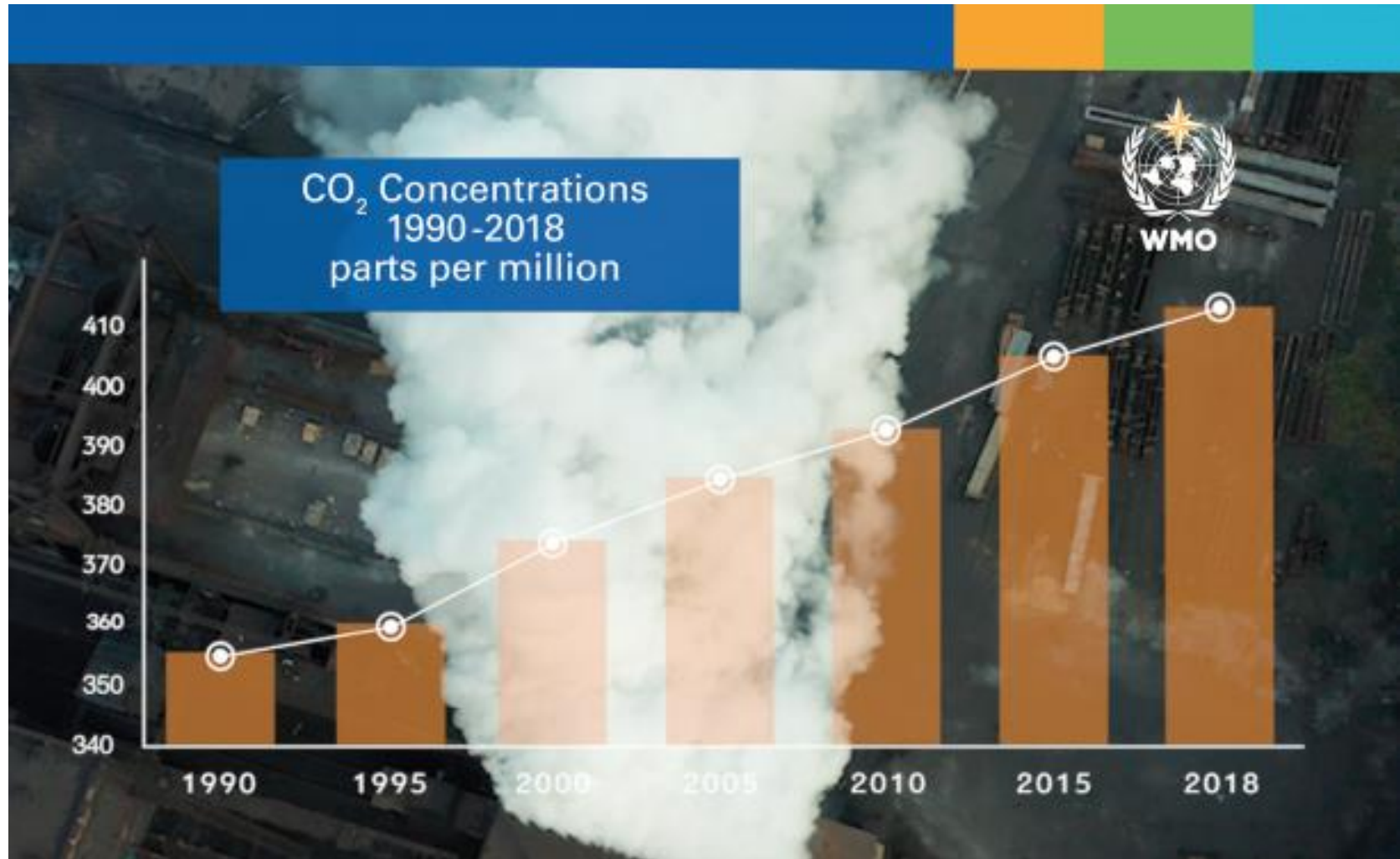


## Cumulative CO<sub>2</sub> emissions



<http://ipcc.ch/report/graphics/index.php?t=Assessment%20Reports&r=AR5%20-%20Synthesis%20Report&f=Topic%201>  
IPCC AR5 Synthesis report

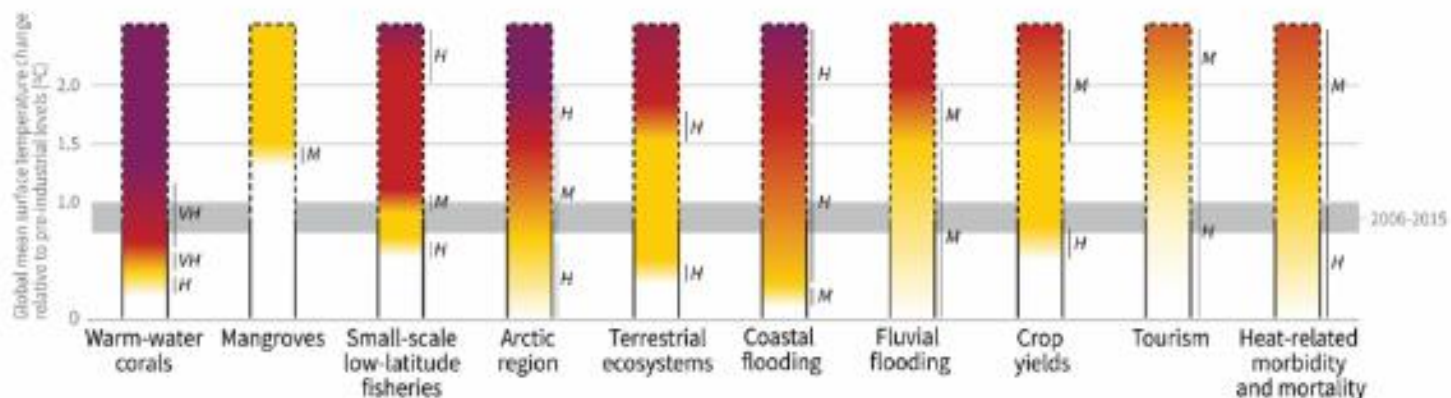
# WMO: CO<sub>2</sub> concentrations rising



# So what is the challenge to be mastered?

- Limit temperature increases to under 2 °C.
- Push for 1.5°C target (Paris Agreement).

Impacts and risks for selected natural, managed and human systems



Confidence level for transition: L=Low, M=Medium, H=High and VH=Very high

# Global, national, local

- Global challenge that needs to be addressed at
  - Global level
  - National or regional level
  - Individual level
- Question:

From your (discipline's) point of view, what are the main challenges and what solutions are being suggested?

# From a politics perspective

- Challenge at global level
  - Climate change is a collective action problem – free –riders
  - Enforcement problems, lack of trust
  - Fairness (differentiated responsibilities; historical, current, future or per capita emissions)
- National level
  - Time inconsistency problem
  - Special interest groups
  - Mobilisation
  - ‘Losers’ of climate change policy
- Individual level
  - Collective action problem
  - Personal and psychological factors
  - Structural factors (e.g. climate averse infrastructure)

# The Good News - Cheapest Technology for energy production (NZZ / BNEF)

Country	2014	2019
China	Coal	Wind
USA	Gas	Wind
India	Coal	Solar
Russia	Gas	Gas
Japan	Coal	Coal
Germany	Wind	Wind
Saudi Arabia	Gas	Solar
Canada	Gas	Wind
Brazil	Gas	Wind
South Africa	Coal	Solar
Mexico	Gas	Wind
Indonesia	Coal	Coal
Thailand	Coal	Coal

- Climate change is a global challenge
- Climate change is a multi-sectoral challenge
- Climate change is a multidisciplinary and interdisciplinary challenge
- Climate change is a societal challenge
- Climate change is an economic challenge
- Climate change is an individual challenge

# Discussion

- Which solutions do you support and why?
- Who should take action?
- Market solutions (carbon tax, cap and trade)?
- Do you know if your carbon footprint is decreasing?