

NO  
POVERTY



2 NO  
HUNGER



3 GOOD  
HEALTH



4 QUALITY  
EDUCATION



5 GENDER  
EQUALITY



6 CLEAN WATER  
AND SANITATION



RENEWABLE  
ENERGY

8 GOOD JOBS AND  
ECONOMIC GROWTH



9 INNOVATION AND  
INFRASTRUCTURE



10 REDUCED  
INEQUALITIES



11 SUSTAINABLE CITIES  
AND COMMUNITIES



12 RESPONSIBLE  
CONSUMPTION



# SDGs and Engineering

Christian Thuesen, Head of section, Assoc. Prof.

Research interests: Projects as vehicle for societal change, including construction, sustainable development, humanitarian work, innovation, learning and digitalization

4 LIFE BELOW  
WATER



15 LIFE  
ON LAND



16 PEACE AND  
JUSTICE



17 PARTNERSHIPS  
FOR THE GOALS



**THE GLOBAL GOALS**  
For Sustainable Development

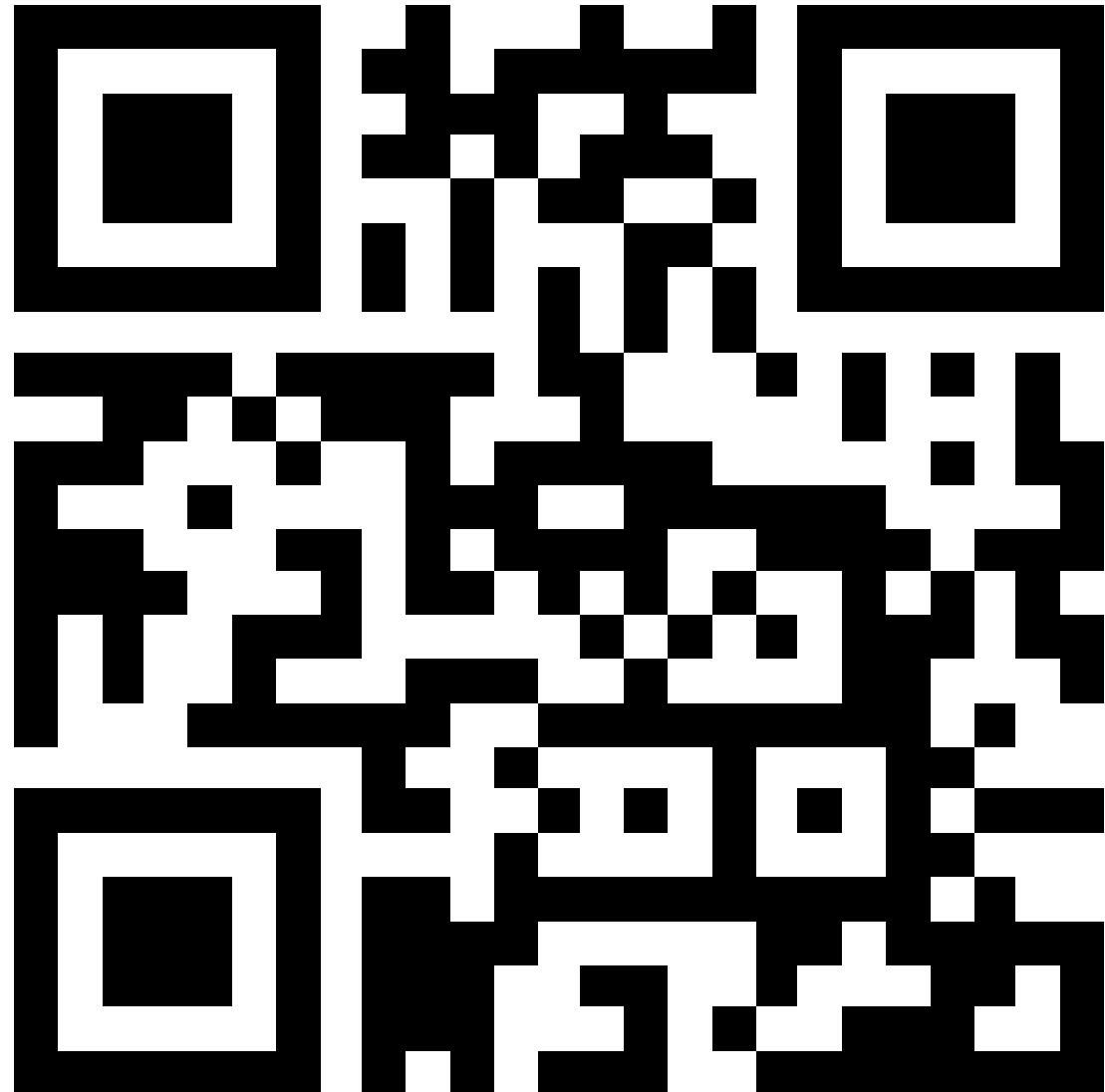




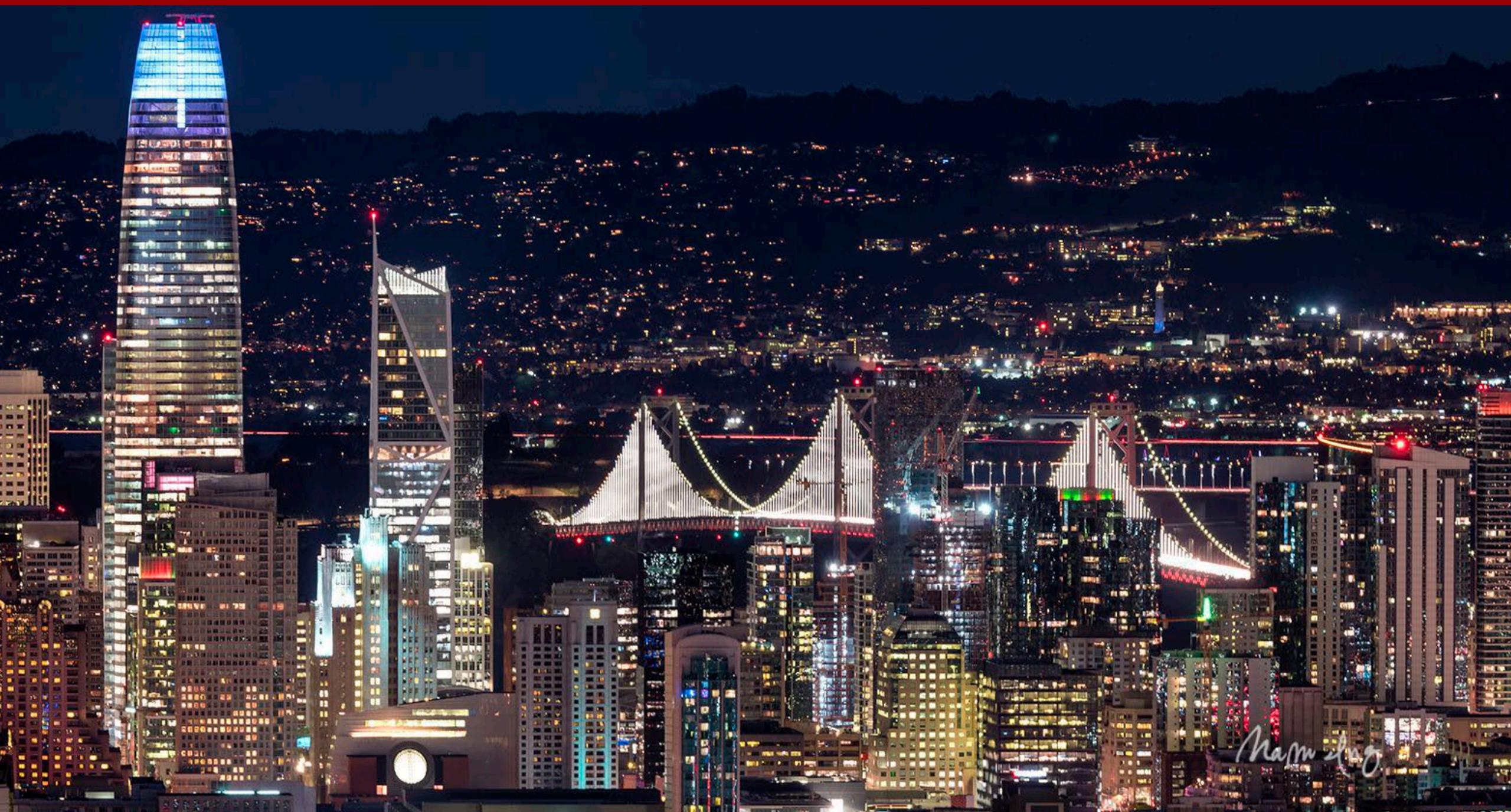
# Student survey

Please fill out the survey on  
“Engineering's role in addressing the SDGs”

<https://tinyurl.com/sdgeng>









Terrythethunder 2020

# Agenda

- What is engineer's role in society?
- What are the worlds problems?
- What is engineer's role in addressing the SDGs?
- How far are we?
- Do we do the right things?



# Dashboard

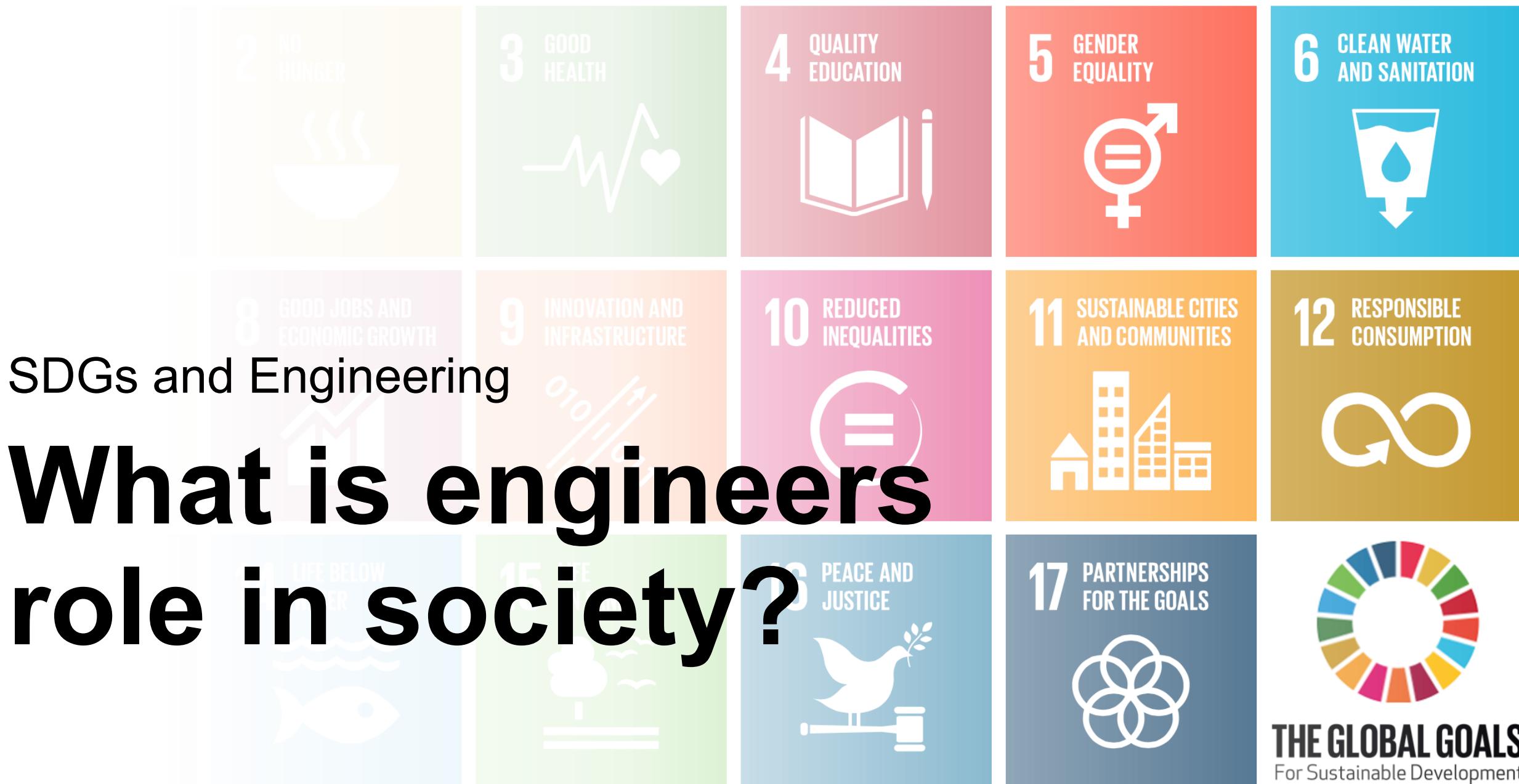
Please check out the latest dataset and visualization on our Dashboard

<https://tinyurl.com/sdgdb>



## SDGs and Engineering

# What is engineers role in society?



**THE GLOBAL GOALS**  
For Sustainable Development

# What is an engineer?

# ENGINEER

**noun.** [en-juh-neer]

Someone who does precision  
guesswork based on unreliable  
data provided by those of  
questionable knowledge.

See also *wizard, magician*

## Wikipedia:

Engineers design materials, structures, and systems while considering the limitations imposed by practicality, regulation, safety, and cost. The word engineer (from the Latin *ingeniator*) is derived from the Latin words *ingeniare* ("to contrive, devise") and *ingenium* ("cleverness")

## Prejudices:

# Ingeniører



# DTUs Mission

*DTU will develop and create value using the natural sciences and the technical sciences to benefit society.*

HC Ørsted 1829

The SDGs can help to set the direction of DTU activities, by qualifying what "to benefit society" entails.



# Engineering has played a large role on creating our past, and will have a critical role in shaping our future



Engineering's contribution to our past and future is unanimously agreed across markets

- █ Engineering innovations have driven progress in society in the past
- █ Engineering innovations will drive progress in society in the future

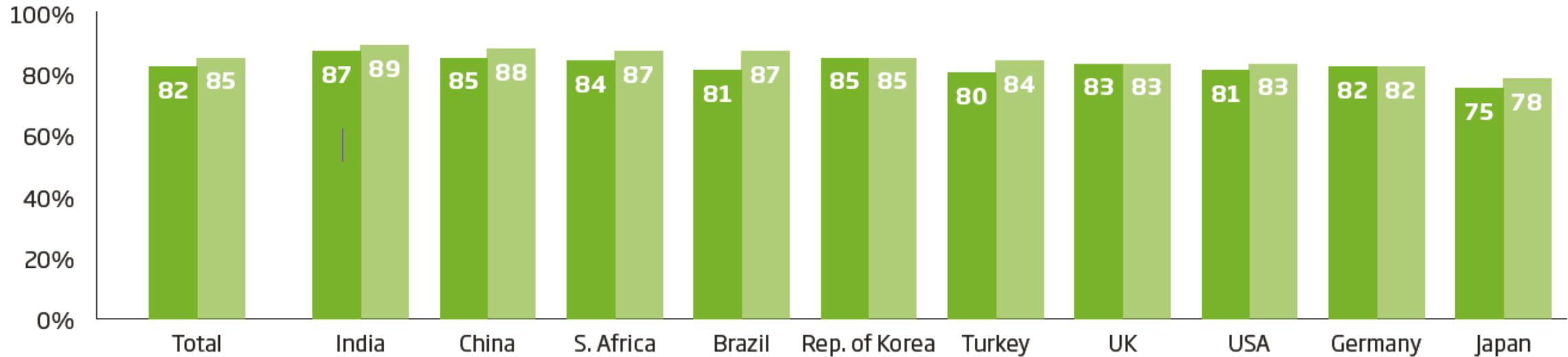


Fig.1. Below are some statements about engineering's contribution to society. Please indicate on the scale below how much you agree or disagree with the following // Base: All Respondents 10341. Net: Doing a little / a lot Net: Somewhat / Strongly agree.

# Engineering's impact on society



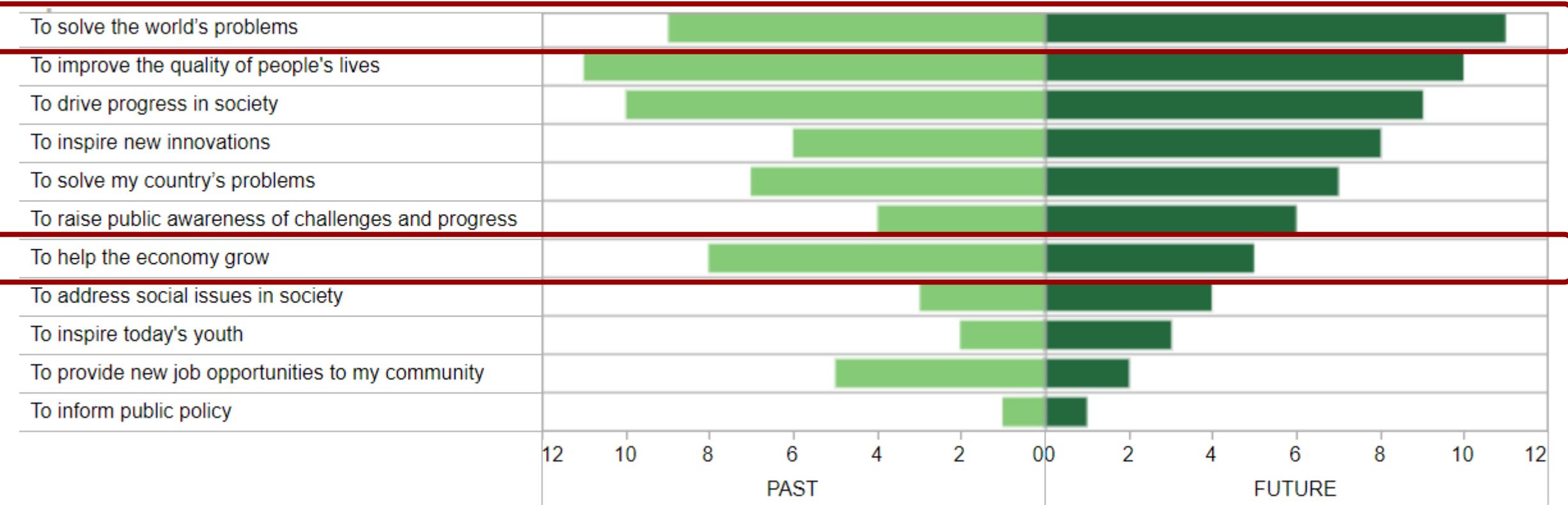
Question: Here are some statements about engineering's contribution to society. Please indicate on the scale below how much you agree or disagree...

# The perceived role of engineering is shifting to solving the world's problems

THE ROLE OF ENGINEERING TODAY			THE ROLE OF ENGINEERING IN THE NEXT 20 YEARS		
1st	To <b>inspire</b> new innovations	59%	1st	To <b>solve the world's problems</b>	57%
2nd	To <b>improve</b> the quality of people's lives	58%	2nd	To <b>inspire</b> new innovations	55%
3rd	To help the <b>economy grow</b>	57%	3rd	To <b>improve</b> the quality of people's lives	55%
4th	To drive progress in society	55%	4th	To drive progress in society	54%
5th	To provide new job opportunities to my community	51%	5th	To <b>solve my country's problems</b>	54%
6th	To <b>solve my country's problems</b>	44%	6th	To help the <b>economy grow</b>	53%
7th	To <b>solve the world's problems</b>	42%	7th	To provide new job opportunities to my community	49%
8th	To <b>inspire today's youth</b>	58%	8th	To raise public awareness of challenges and progress	46%
9th	To raise public awareness of challenges and progress	48%	9th	To <b>inspire today's youth</b>	45%
10th	To inform public policy	40%	10th	To address social issues in society	41%
11th	To address social issues in society	39%	11th	To inform public policy	40%

In your opinion, which of the following describes the role of engineering within society today and in the future? // Base: All respondents n=10,341

# The role of engineering...



Question: In your opinion, which of the following statements describe the role of engineering within society in the PAST, PRESENT and FUTURE.

2 NO HUNGER



3 GOOD HEALTH



4 QUALITY EDUCATION



5 GENDER EQUALITY



6 CLEAN WATER AND SANITATION



8 GOOD JOBS AND ECONOMIC GROWTH

8

9 INNOVATION AND INFRASTRUCTURE

9



10 REDUCED INEQUALITIES

10



11 SUSTAINABLE CITIES AND COMMUNITIES

11



12 RESPONSIBLE CONSUMPTION

12



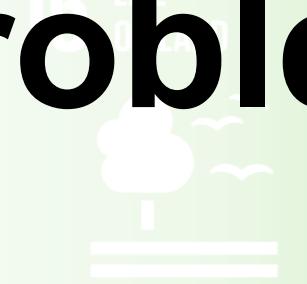
SDGs and Engineering

What are the  
worlds problems?

LIFE BELOW



15 LIFE ON LAND



16 PEACE AND  
REDUCE  
DISARMAMENT



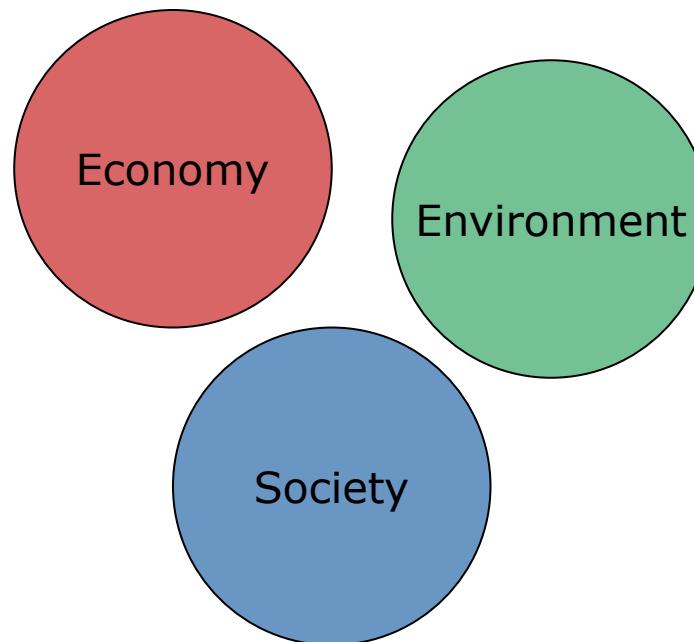
17 PARTNERSHIPS FOR THE GOALS



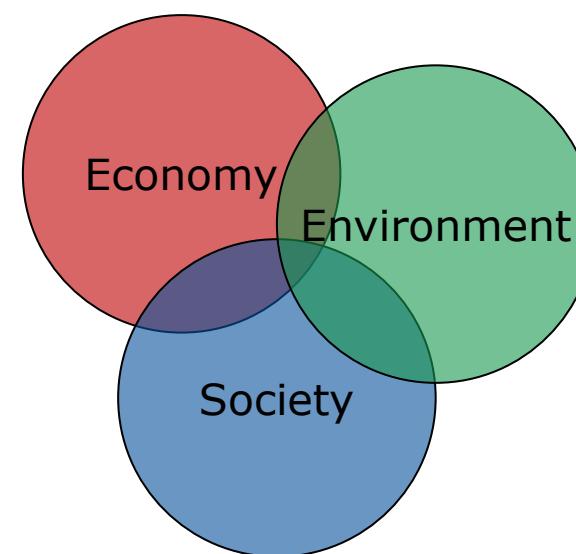
**THE GLOBAL GOALS**  
For Sustainable Development

# Evolution of sustainability

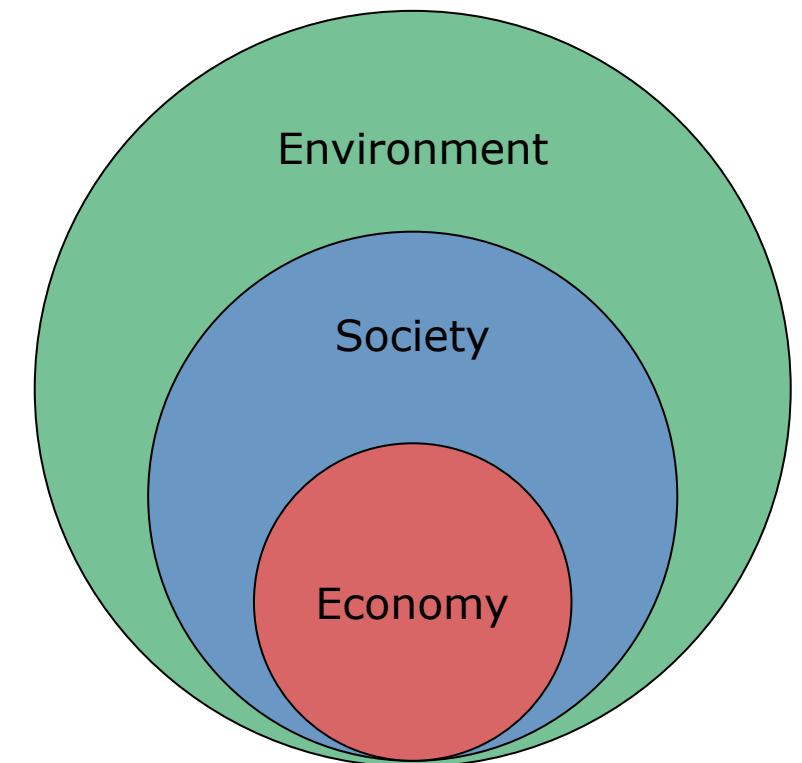
“Humanity has the ability to make development sustainable to ensure that it meets the needs of the present without compromising the ability of future generations to meet their own needs.” (Brundtland 1987):



Unconnected or silos view



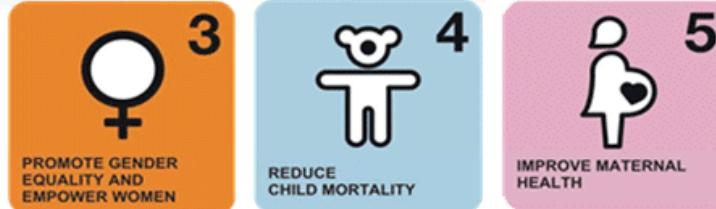
Interconnected or linkages view



Interdependent, nested, or systems view

# Transition From MDGs to SDGs

The 8 Millennium Development Goals

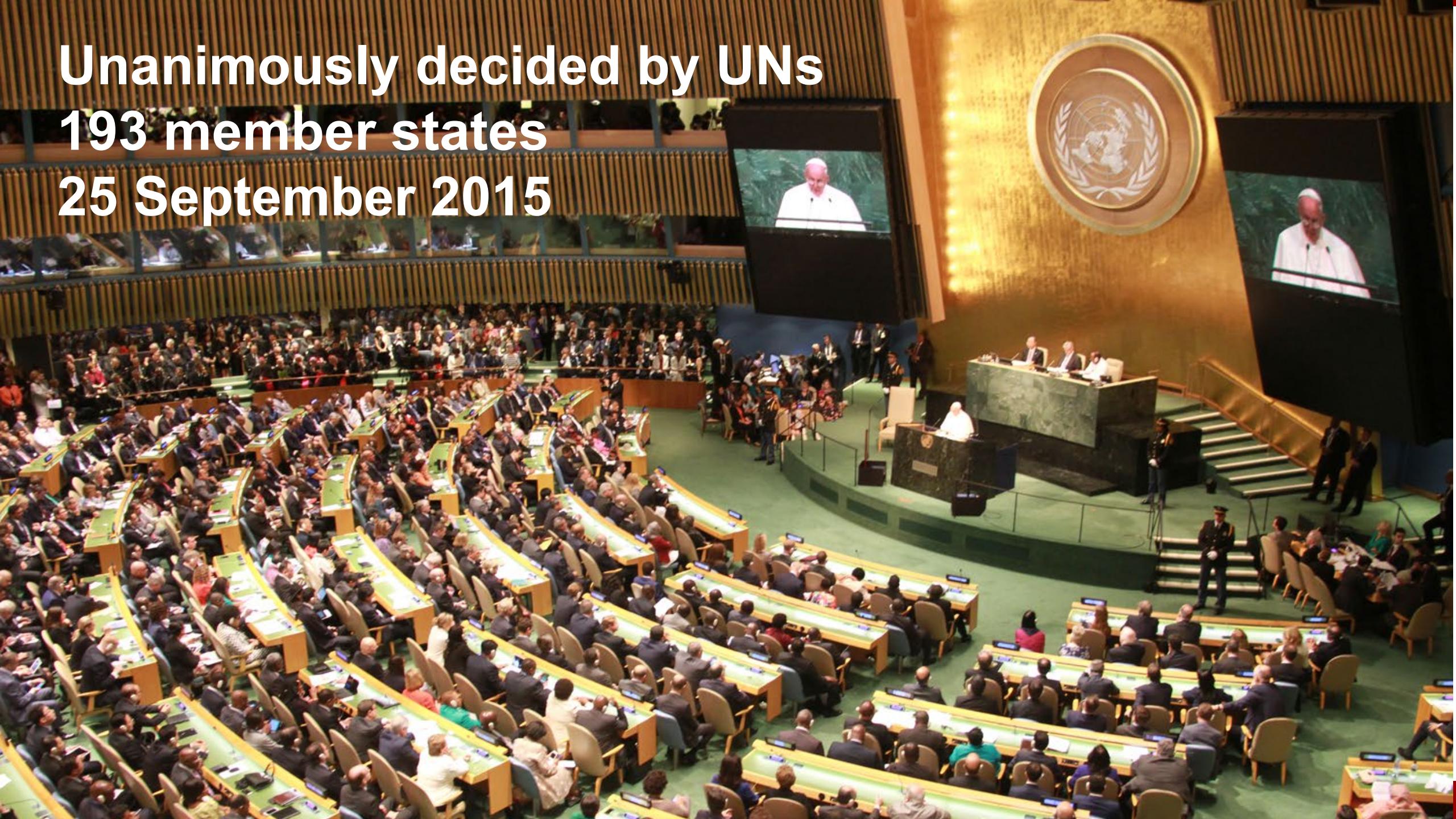


MDGs (2000-2015)  
8 Goals  
21 Targets  
60 indicators



SDGs (2016-2030)  
17 Goals  
169 Targets  
304 indicators

**Unanimously decided by UNs  
193 member states  
25 September 2015**



# Supported by companies (e.g. global compact)

- A voluntary initiative based on CEO commitments to implement universal sustainability principles and to take steps to support UN goals.
- Currently supported by more than 9.000 companies in 170 countries

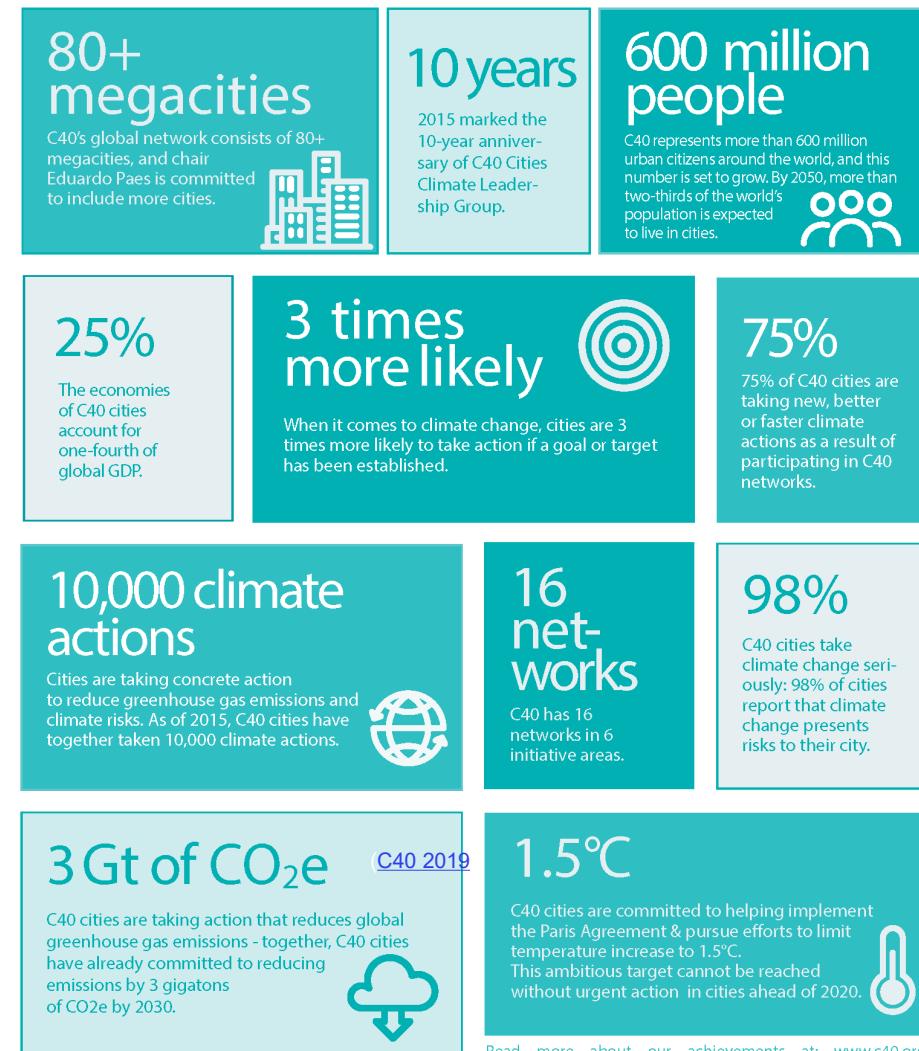
## Examples:

- LEGO
- Rockwool
- Velux
- MT Højgaard
- KMD
- HOFOR
- Danish Crown
- Vestas
- Maersk
- DONG
- Microsoft



# Supported by the worlds major cities

- The C40 Cities connects more than 80 of the world's greatest cities, representing over 600 million people and one quarter of the global economy.
- C40 is focused on tackling climate change and driving urban action that reduces greenhouse gas emissions and climate risks, while increasing the health, wellbeing and economic opportunities of urban citizens.

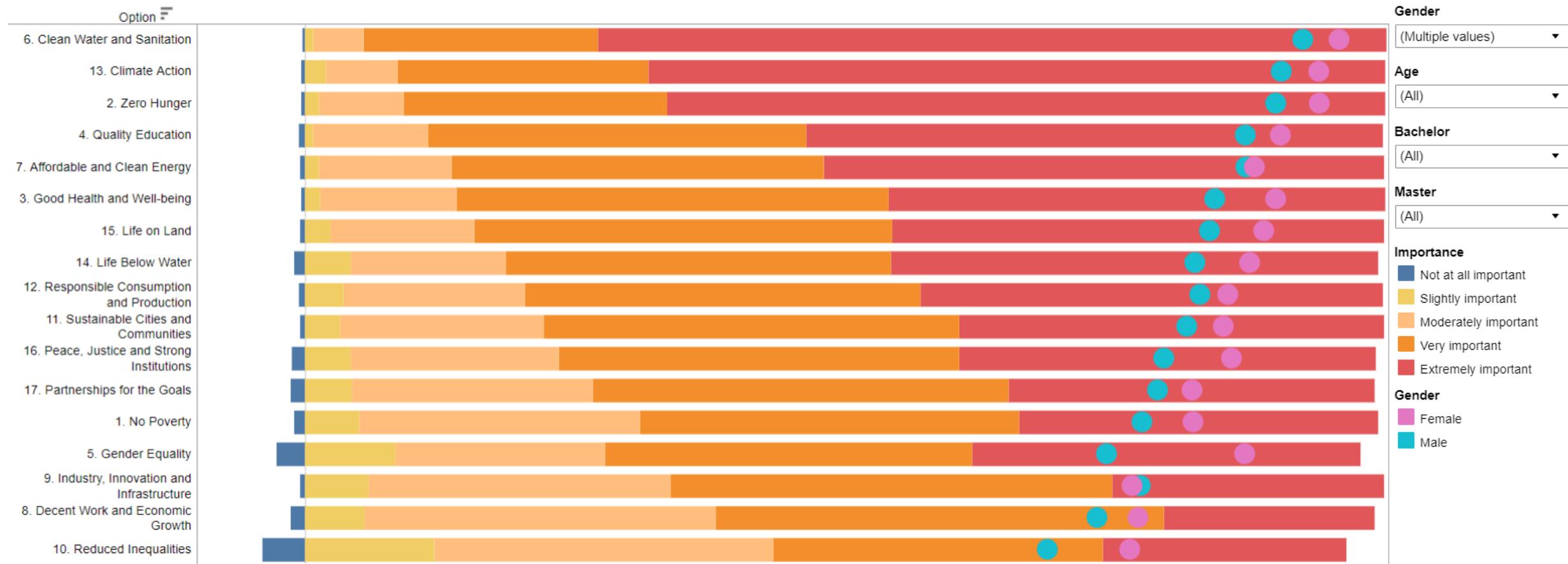




SDGs and Engineering

# What is engineer's role in addressing the SDGs?

# How important are the SDGs?

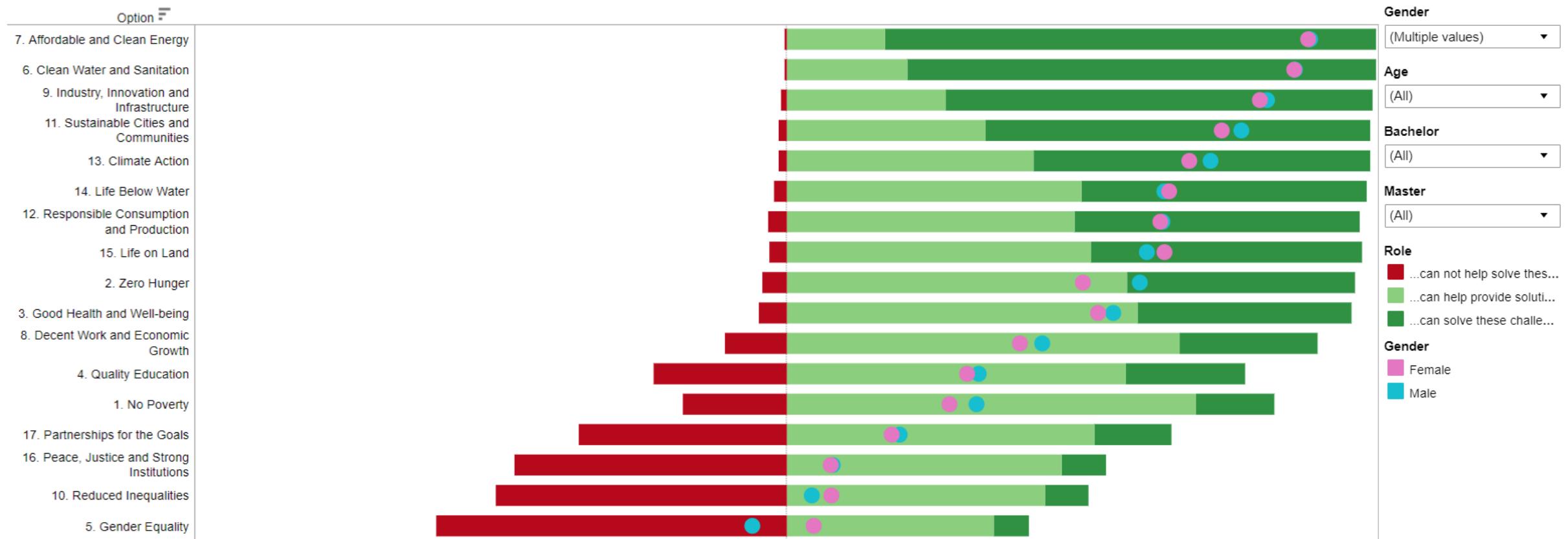


Question: How *important* do you think each of the following SDGs are?

# How important are the SDGs?

SDG	Type	Minim	Maxim	Me	Varia		Respondent	Is it important (0-100%)	Cohen 's d
		um	um	an	Std. Dev	nce	count		
1. No Poverty	People	1	5	4,0	0,9	0,8	3726	76%	-0,2
2. Zero Hunger	People	1	5	4,6	0,7	0,5	3729	89%	0,4
3. Good Health and Well-being	People	1	5	4,3	0,8	0,6	3721	83%	0,1
4. Quality Education	People	1	5	4,4	0,7	0,5	3725	85%	0,2
5. Gender Equality	People	1	5	4,0	1,0	1,1	3722	75%	-0,2
6. Clean Water & Sanitation	Planet	1	5	4,7	0,6	0,4	3725	91%	0,5
7. Affordable and Clean Energy	Profit	1	5	4,4	0,8	0,6	3726	85%	0,2
8. Decent Work & Economic Growth	Profit	1	5	3,7	0,9	0,8	3722	69%	-0,5
9. Industry Innovation & Infrastructure	Profit	1	5	3,9	0,9	0,8	3720	72%	-0,3
10. Reduced Inequalities	People	1	5	3,7	1,1	1,1	3720	67%	-0,6
11. Sustainable Cities and Communities	Profit	1	5	4,1	0,9	0,8	3715	78%	-0,1
12. Responsible Consumption & Production	Planet	1	5	4,2	0,9	0,7	3718	81%	0,1
13. Climate Action	Planet	1	5	4,6	0,7	0,5	3721	90%	0,4
14. Life Below Water	Planet	1	5	4,3	0,9	0,7	3723	81%	0,1
15. Life on Land	People	1	5	4,3	0,8	0,6	3721	83%	0,1
16. Peace Justice & Strong Institutions	People	1	5	4,1	0,9	0,8	3720	78%	-0,1
17. Partnerships		1	5	4,0	1,0	0,9	3718	75%	-0,2

# Engineerings role in solving the SDGs?



Question: To what extent do you think *engineering in general* can help provide solutions for the following SDGs?

# Engineerings role in solving the SDGs?

SDG	Type	Min	Max	Me	Varia	Responde	Role of eng. (0-	Cohen	
				an	Std. Dev	nce	t count	100%)	
1. No Poverty	People	1	3	1,9	0,5	0,3	3672	47%	-0,4
2. Zero Hunger	People	1	3	2,3	0,5	0,3	3677	66%	0,1
3. Good Health and Well-being	People	1	3	2,3	0,6	0,3	3674	66%	0,1
4. Quality Education	People	1	3	2,0	0,6	0,4	3670	49%	-0,4
5. Gender Equality	People	1	3	1,5	0,6	0,4	3670	24%	-1,1
6. Clean Water and Sanitation	Planet	1	3	2,8	0,4	0,2	3669	89%	0,8
7. Affordable and Clean Energy	Profit	1	3	2,8	0,4	0,2	3675	91%	0,9
8. Decent Work & Economic Growth	Profit	1	3	2,1	0,6	0,3	3673	54%	-0,2
9. Industry Innovation & Infrastructure	Profit	1	3	2,7	0,5	0,2	3676	85%	0,7
10. Reduced Inequalities	People	1	3	1,6	0,6	0,4	3669	30%	-0,9
11. Sustainable Cities and Communities	Profit	1	3	2,6	0,5	0,3	3673	80%	0,5
12. Responsible Consumption & Production	Planet	1	3	2,4	0,6	0,3	3670	71%	0,3
13. Climate Action	Planet	1	3	2,5	0,5	0,3	3674	77%	0,5
14. Life Below Water	Planet	1	3	2,4	0,5	0,3	3673	72%	0,3
15. Life on Land	People	1	3	2,4	0,5	0,3	3671	71%	0,3
16. Peace Justice & Strong Institutions	People	1	3	1,6	0,6	0,4	3669	29%	-0,9
17. Partnerships for the Goals		1	3	1,7	0,6	0,4	3668	37%	-0,7

## SDGs and Engineering

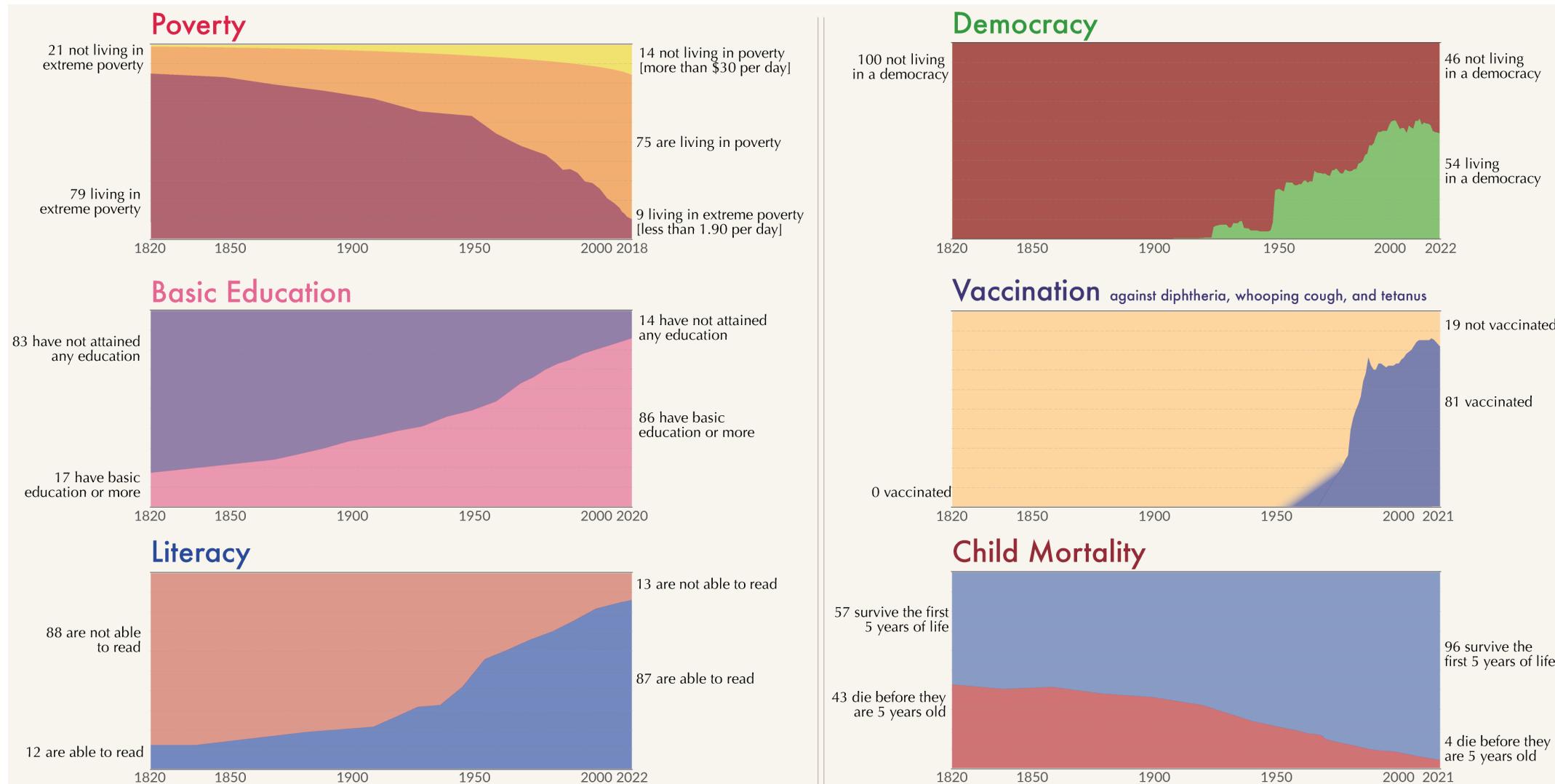
# How far are we?



**THE GLOBAL GOALS**  
For Sustainable Development

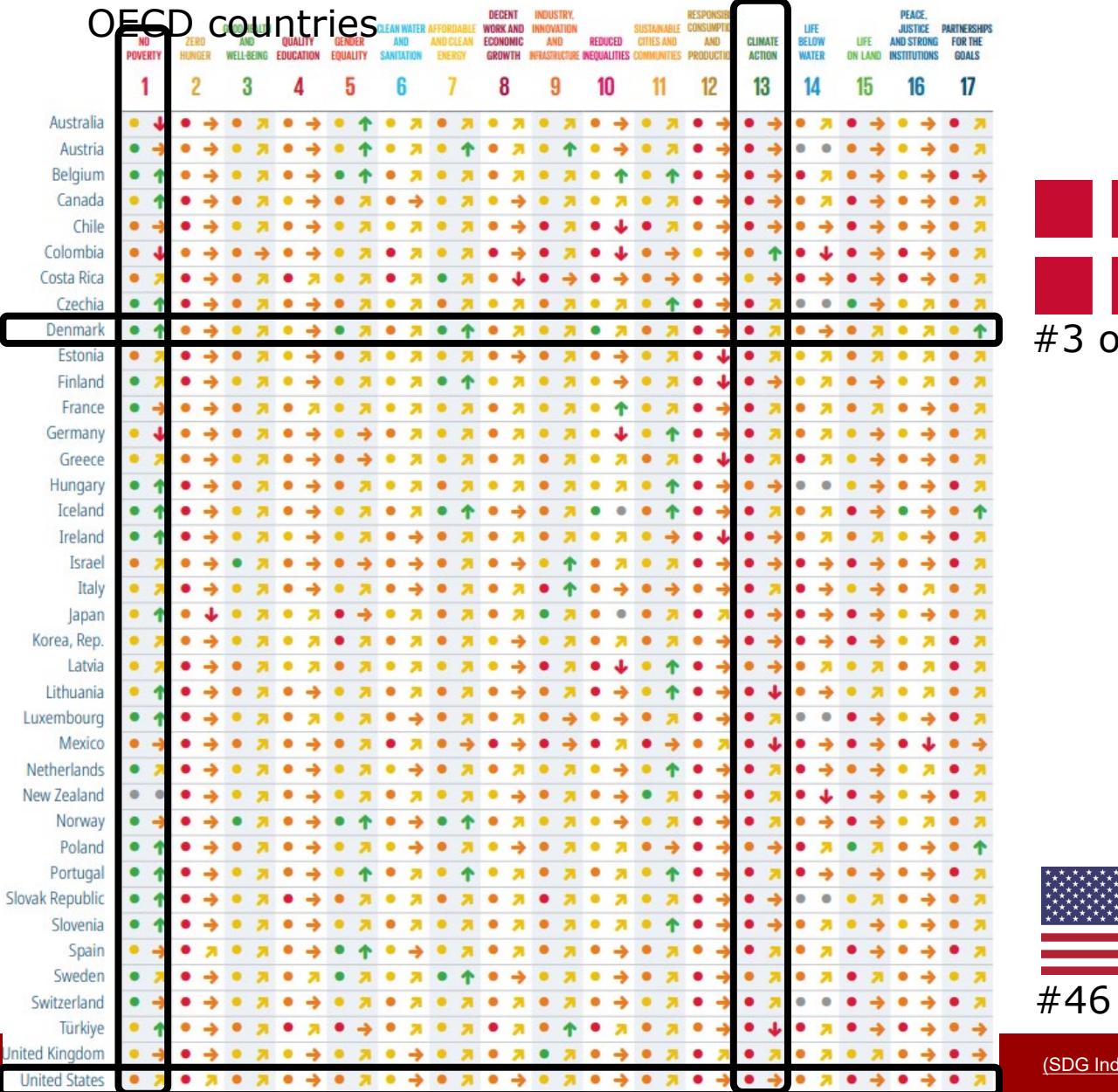
# The big picture

## The world as 100 people over the last two centuries



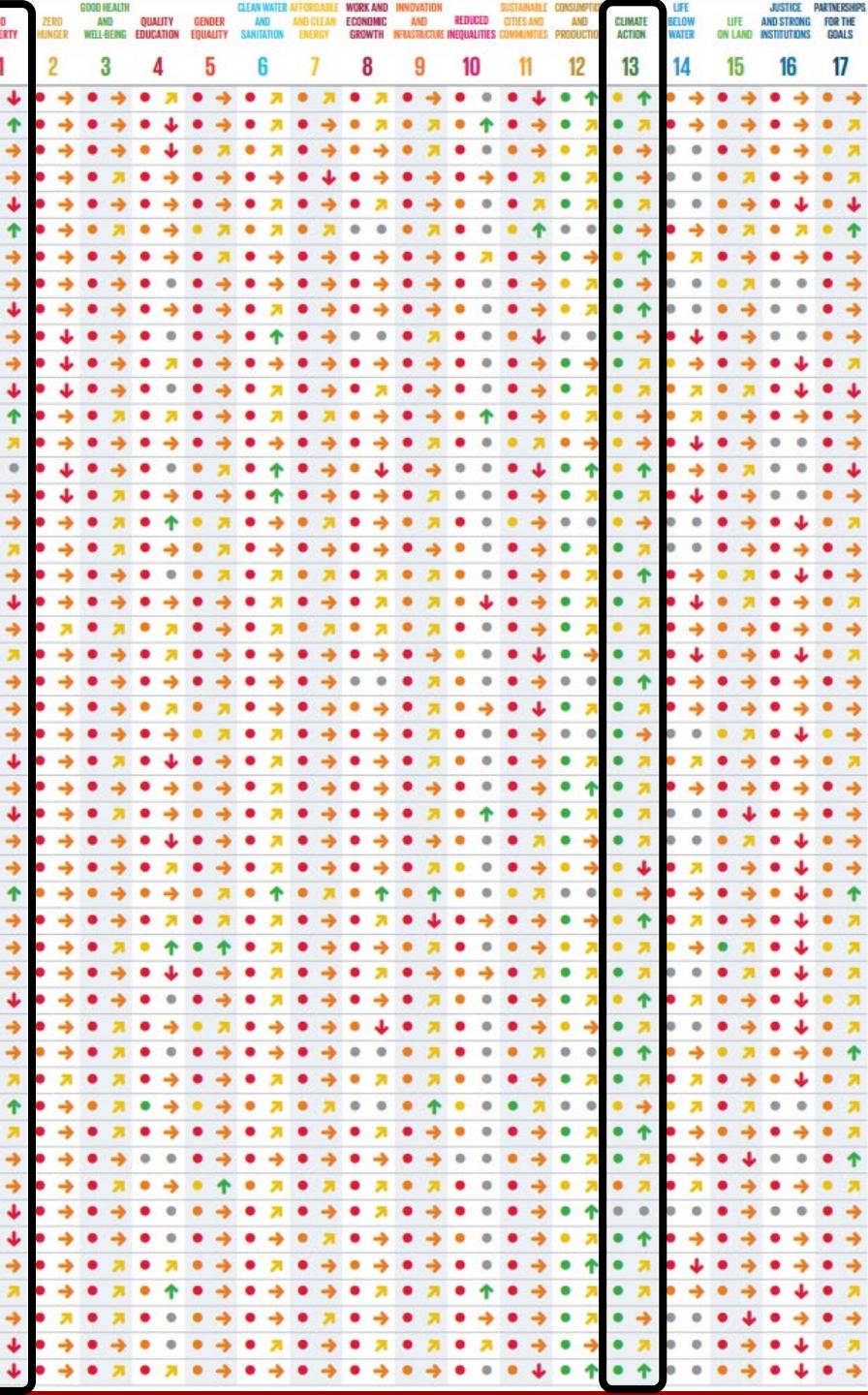
# How far are we?

OECD countries



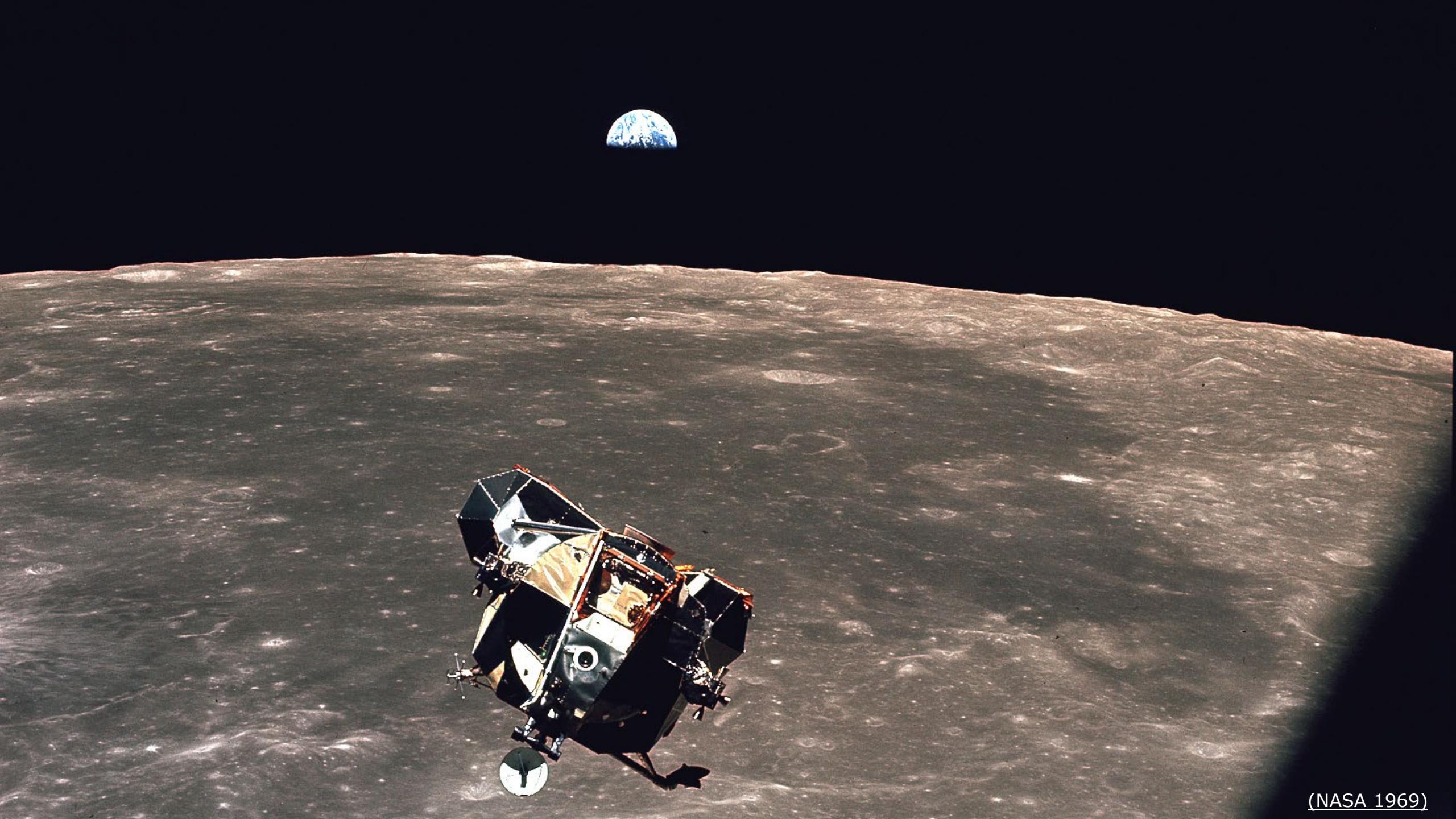
## Sub-Saharan Africa

(SDG Index 2024)



#46 of 165

(SDG Index 2024)

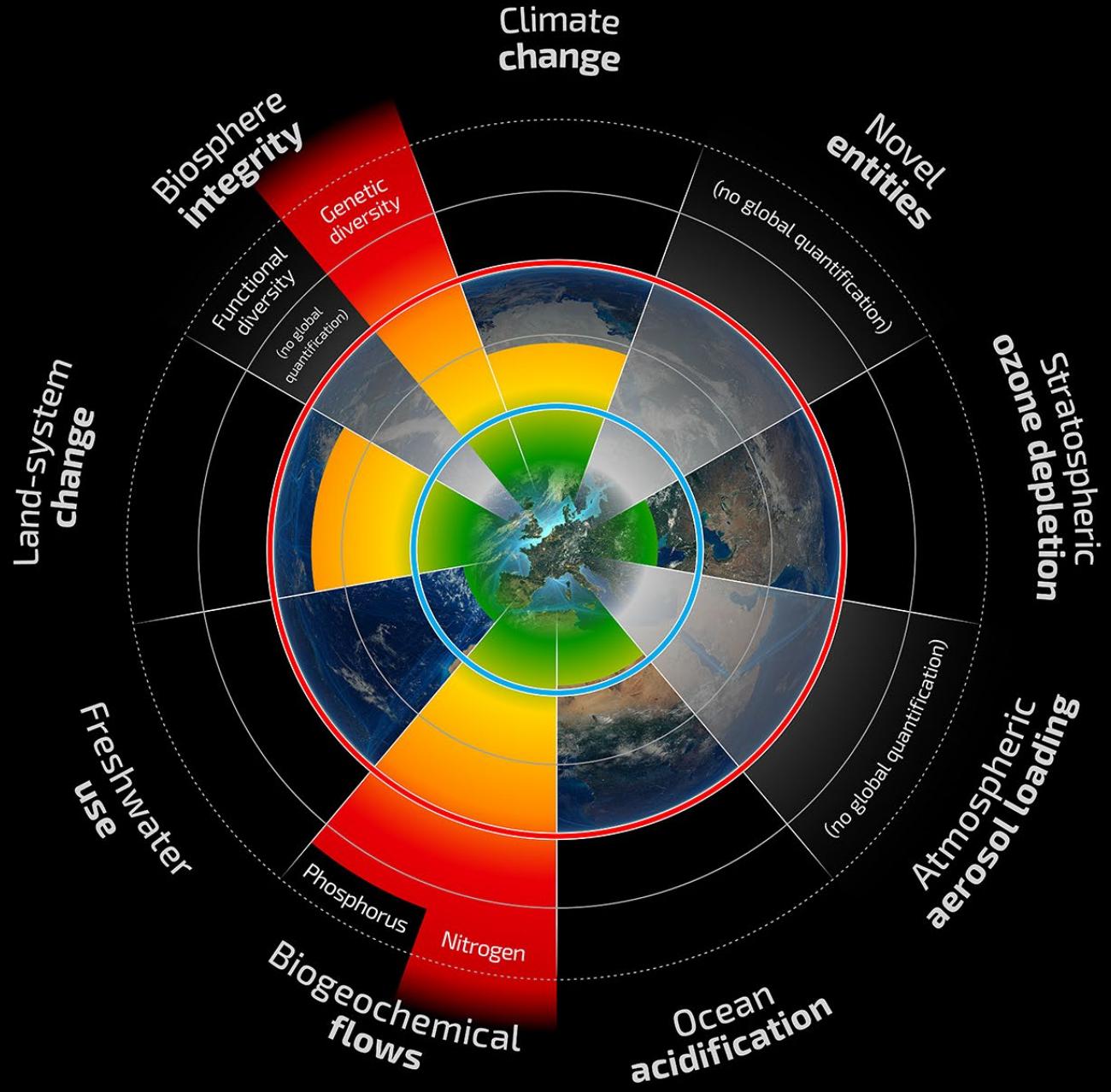


(NASA 1969)

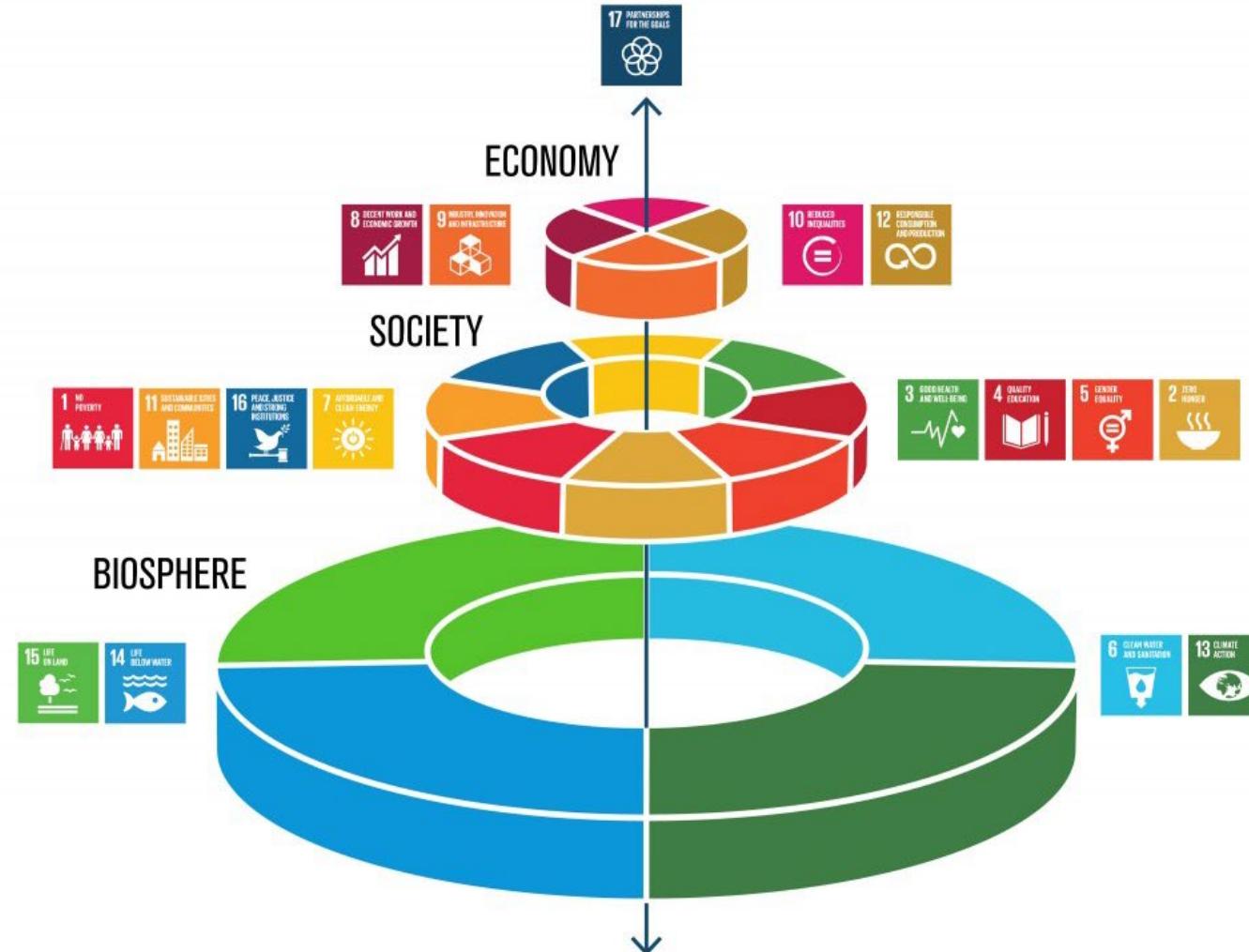
# Planetary boundaries

*A safe operating space  
for humanity*

- **Beyond zone of uncertainty** (high risk)
- **In zone of uncertainty** (increasing risk)
- **Below boundary** (safe)
- **Boundary not yet quantified**



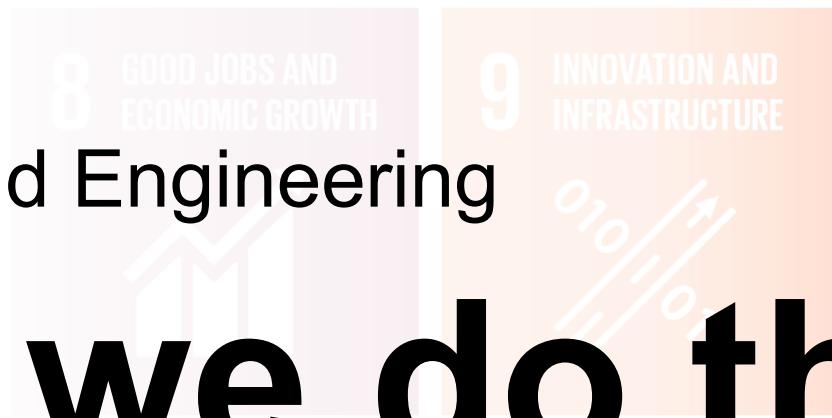
# SDGs and the three domains of sustainability



Design: Stockholm Resilience Centre

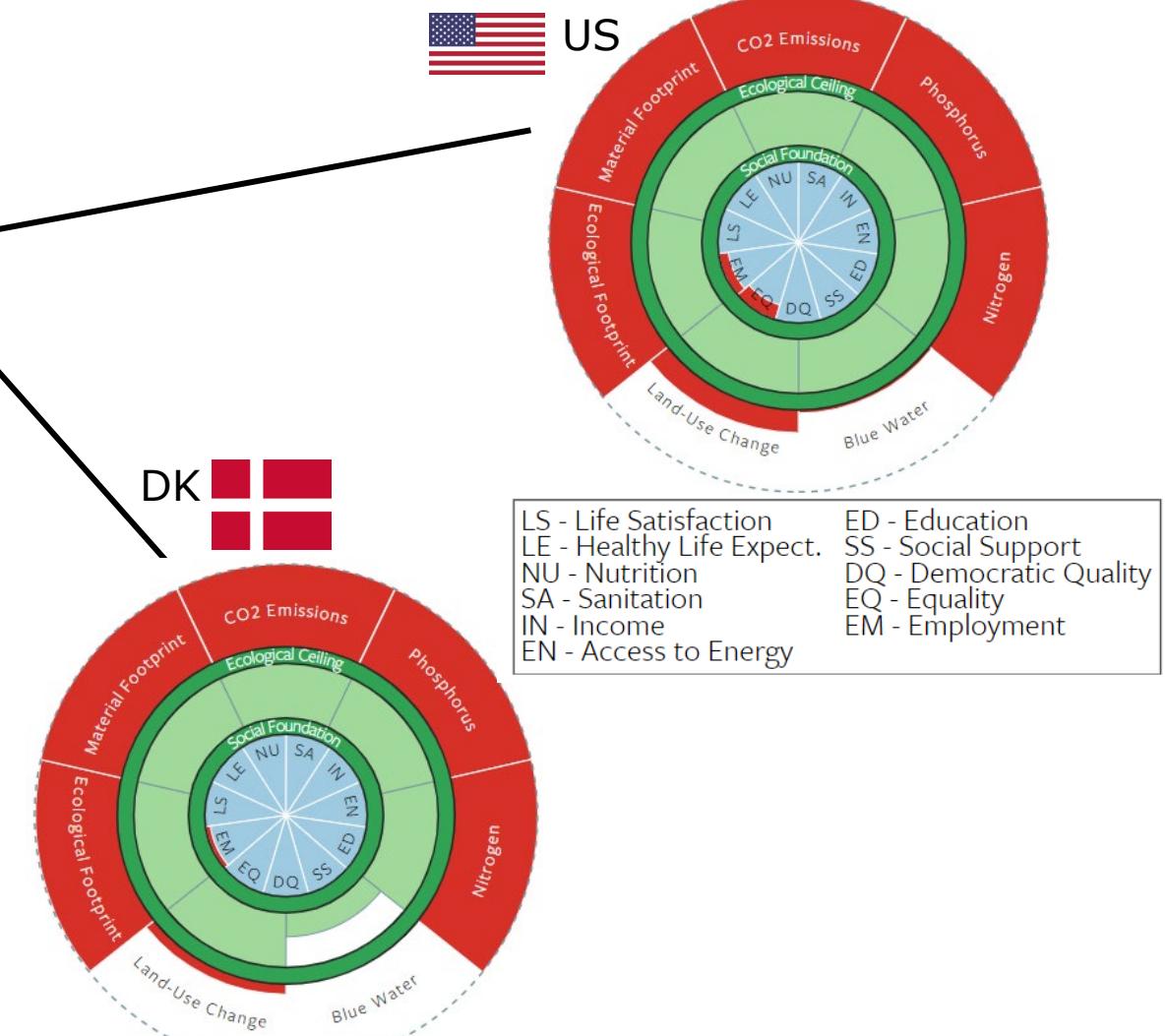
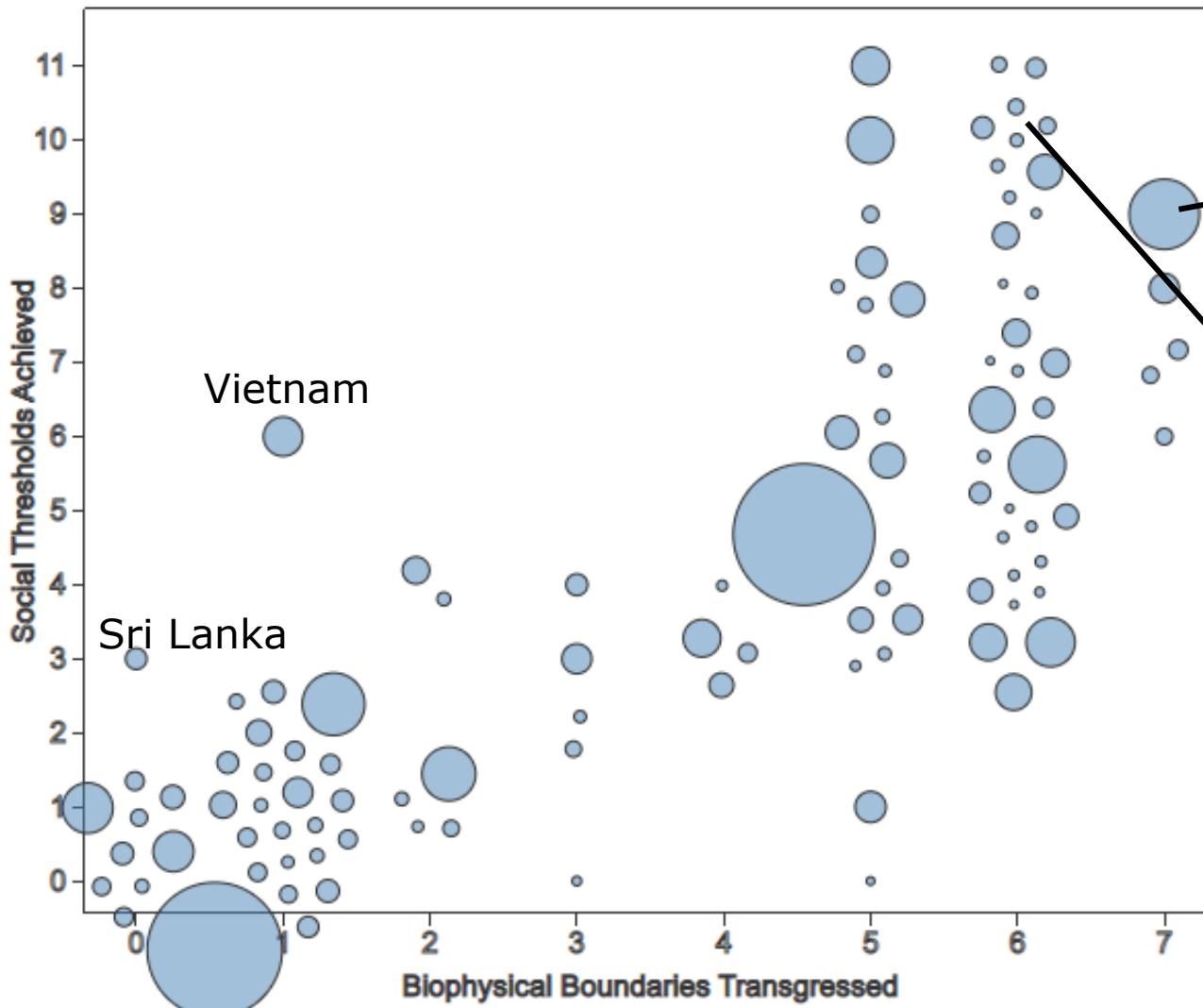
## SDGs and Engineering

# Do we do the right things?

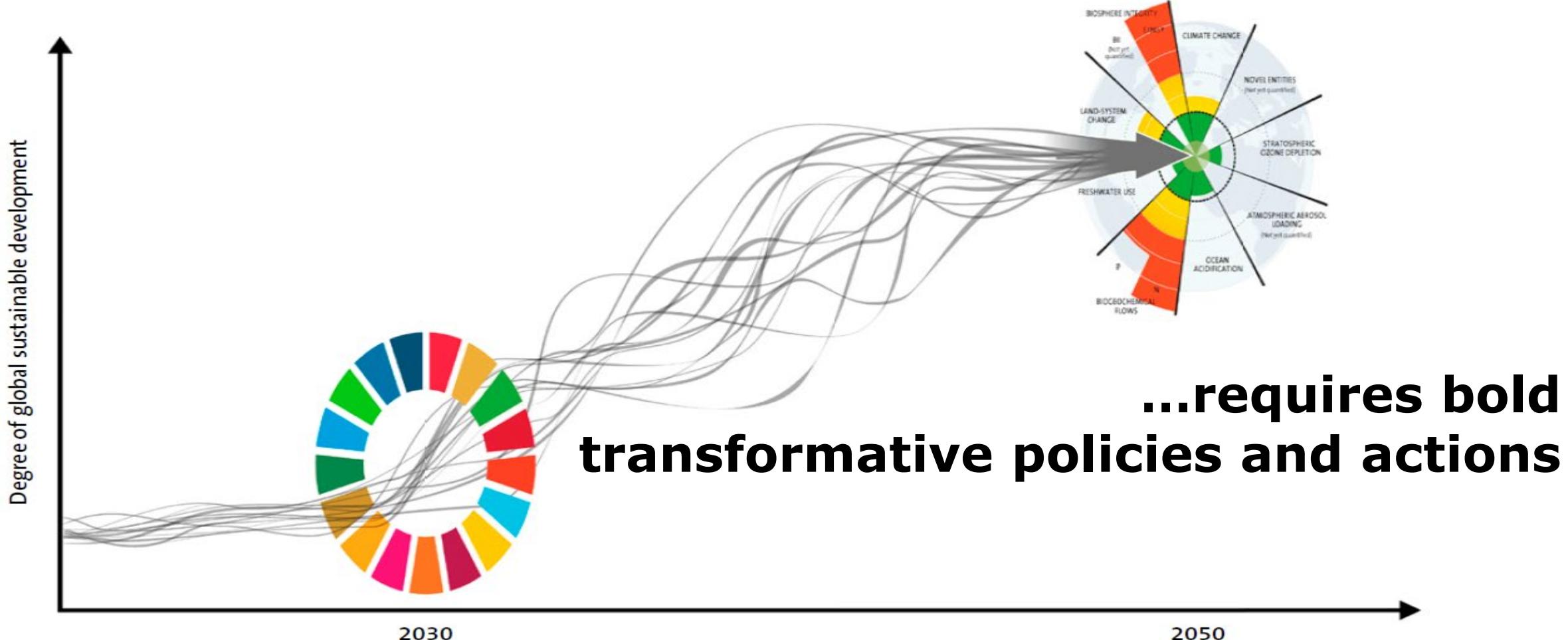


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For Sustainable Development

# A Good Life For All Within Planetary Boundaries

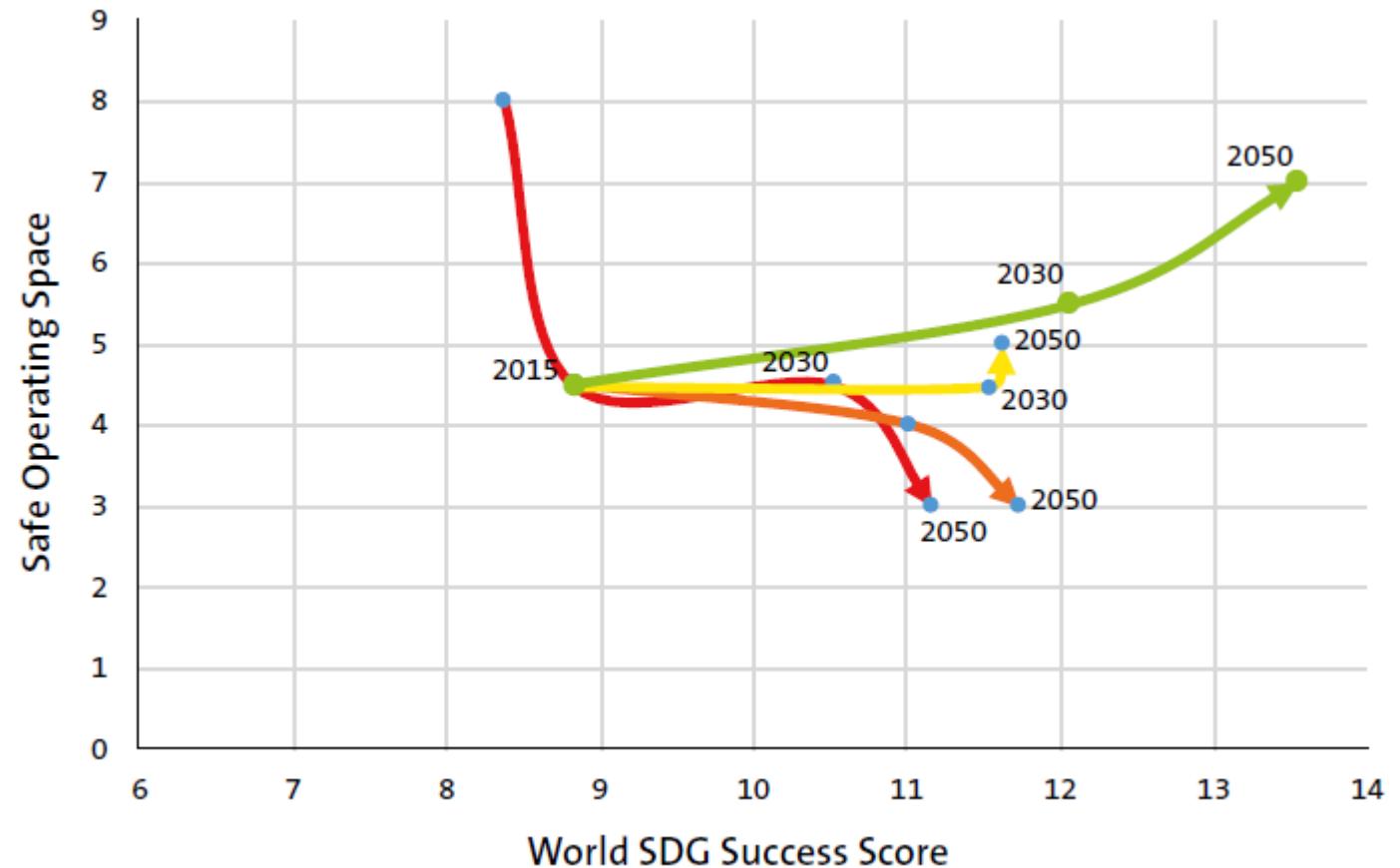


# Achieving the SDGs... ...within Planetary Boundaries

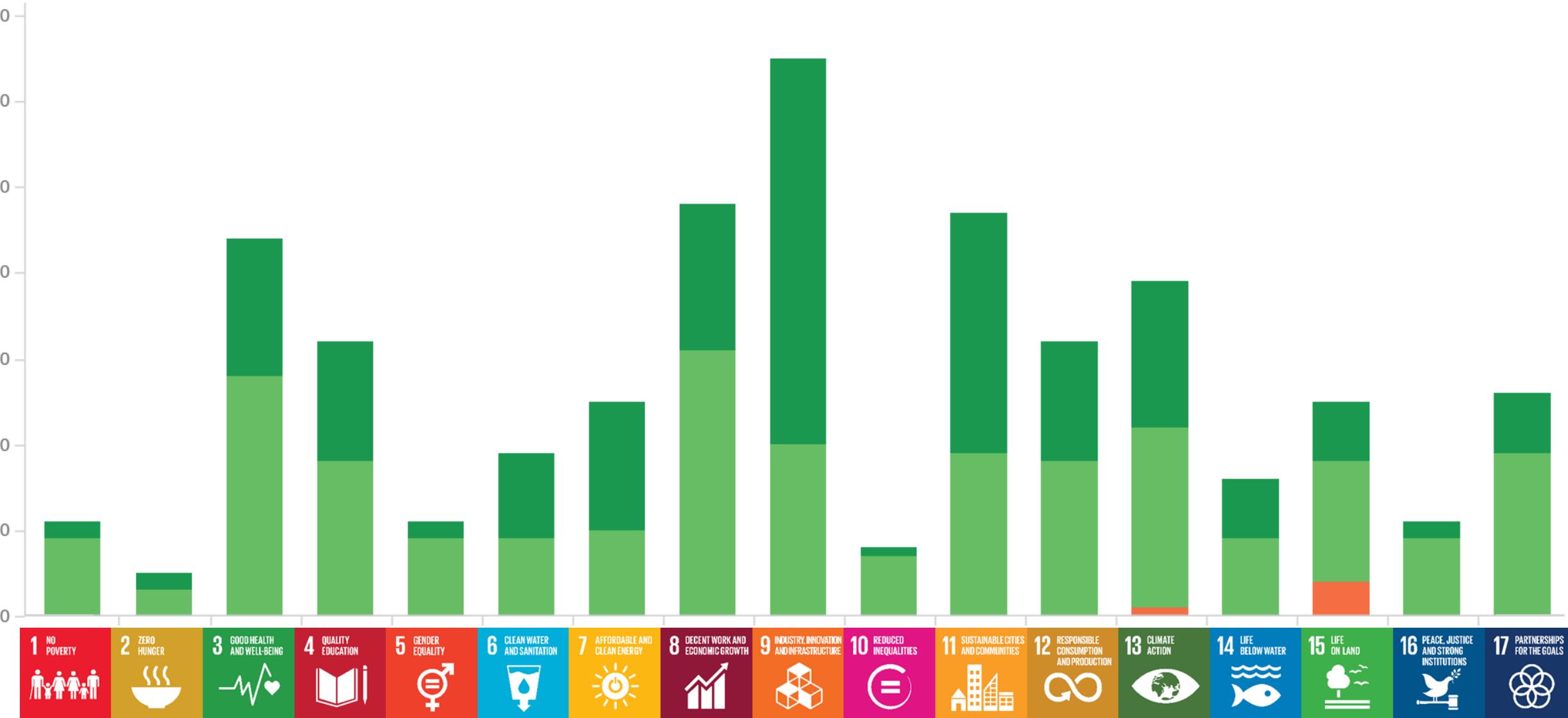


# Scenarios for achieving SDGs within PB

- 4) SMARTER = Bold, transformational policies
- 3) HARDER = Trying harder on all fronts
- 2) FASTER = Higher economic growth
- 1) SAME = Business as Usual



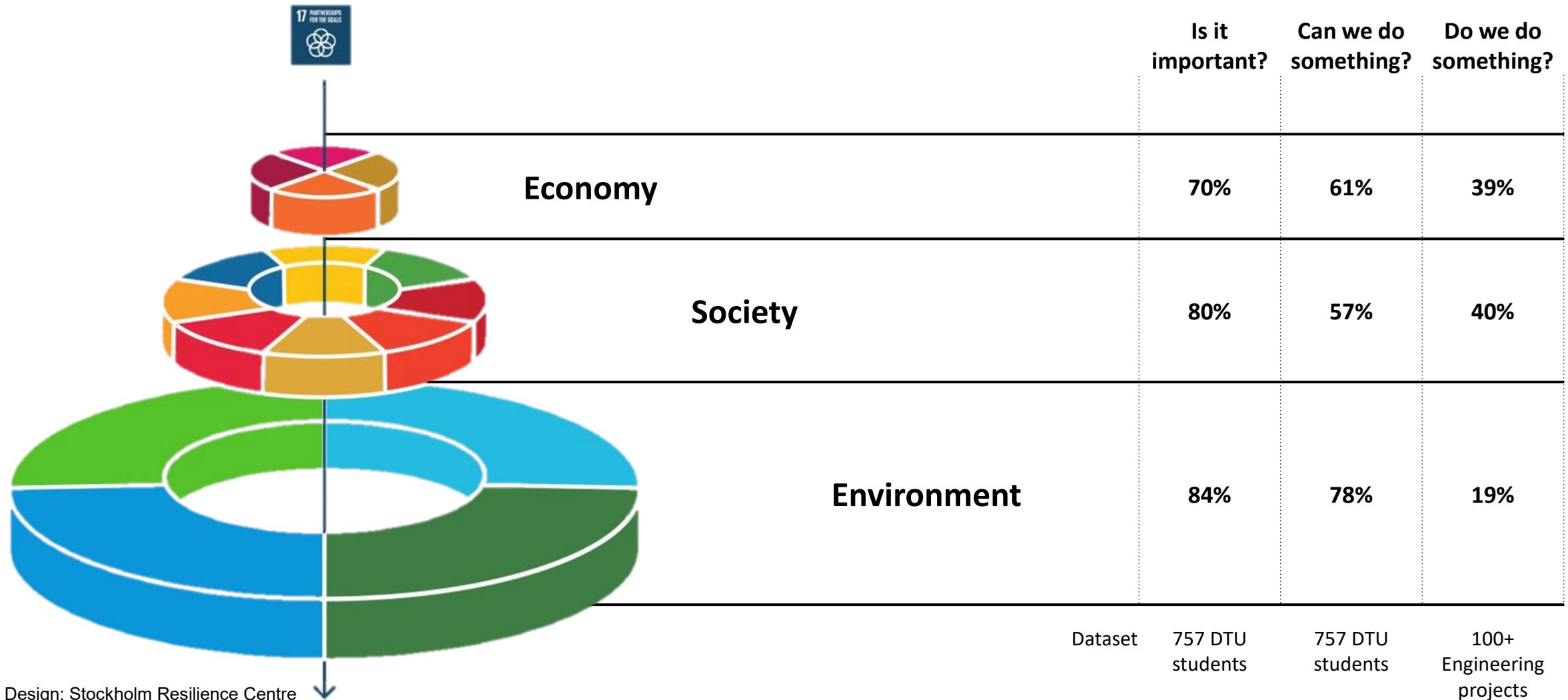
# What SDGs do our current projects address?



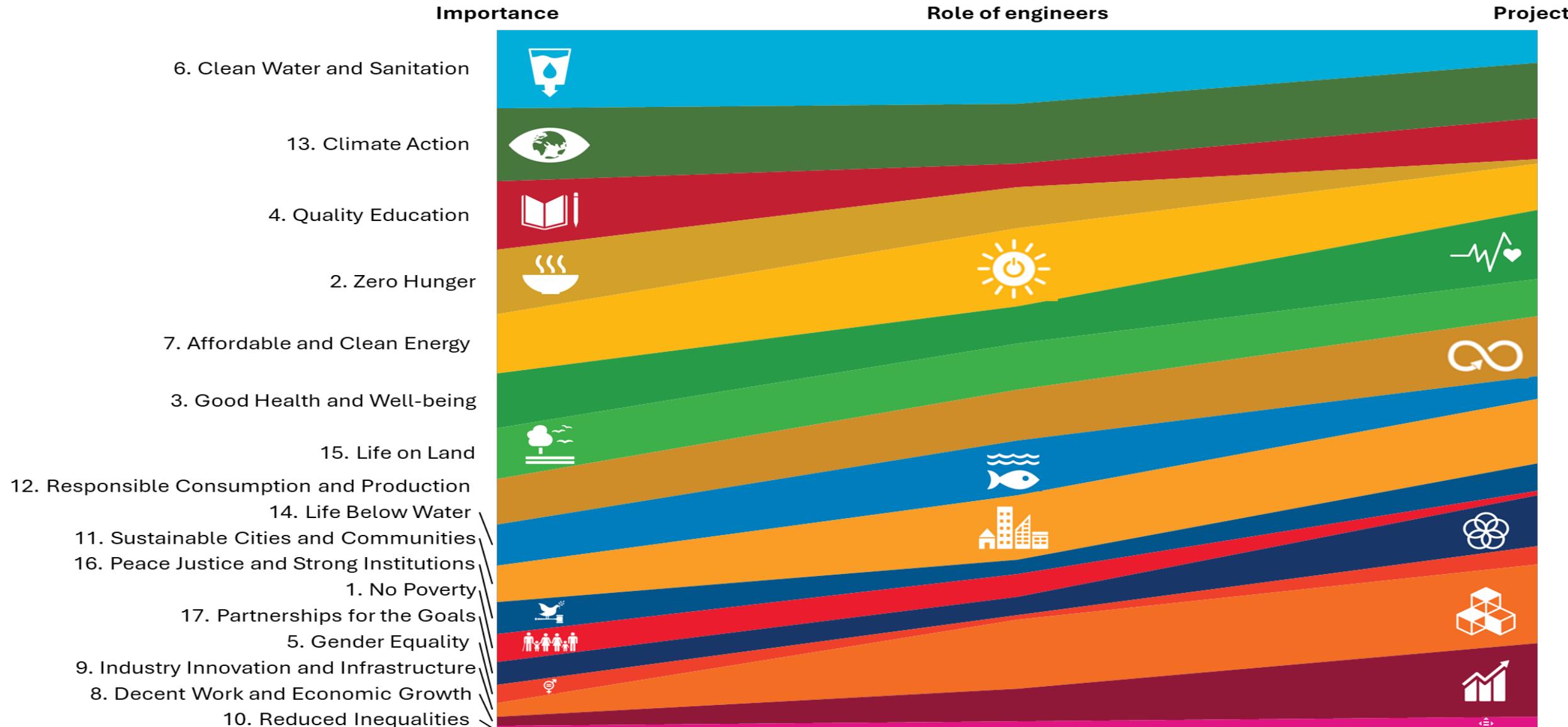
# What SDGs do our current projects address?

SDG	Type	Negative			Neut	Positive	Count of	% pos		% neg	Varia	Cohe	
		directly	indirectly	ral	indirectly	directly	respondents	influe	influen	Me	Std.		
1. No Poverty	People	12	8	600	31	11	662	6%	3%	3,0	0,4	0,2	-0,4
2. Zero Hunger	People	10	4	608	25	15	662	6%	2%	3,0	0,4	0,2	-0,4
3. Good Health and Well-being	People	4	3	331	117	148	603	44%	1%	3,7	0,9	0,8	0,4
4. Quality Education	People	4	2	470	63	98	637	25%	1%	3,4	0,8	0,6	0,0
5. Gender Equality	People	6	3	598	29	25	661	8%	1%	3,1	0,5	0,2	-0,3
6. Clean Water and Sanitation	Planet	9	10	546	38	51	654	14%	3%	3,2	0,6	0,4	-0,2
7. Affordable and Clean Energy	Profit	8	9	460	58	110	645	26%	3%	3,4	0,8	0,7	0,0
8. Decent Work and Economic Growth	Profit	5	4	231	144	193	577	58%	2%	3,9	0,9	0,8	0,6
9. Industry Innovation & Infrastructure	Profit	3	3	172	106	331	615	71%	1%	4,2	0,9	0,8	1,1
10. Reduced Inequalities	People	11	8	591	24	18	652	6%	3%	3,0	0,5	0,2	-0,4
11. Sustainable Cities & Communities	Profit	8	5	325	84	200	622	46%	2%	3,7	1,0	0,9	0,5
12. Responsible Consumption & Production	Planet	8	14	354	82	168	626	40%	4%	3,6	0,9	0,9	0,3
13. Climate Action	Planet	10	23	358	79	152	622	37%	5%	3,5	1,0	0,9	0,2
14. Life Below Water	Planet	17	17	558	39	32	663	11%	5%	3,1	0,6	0,4	-0,4
15. Life on Land	People	14	28	511	49	39	641	14%	7%	3,1	0,7	0,4	-0,3
16. Peace Justice and Strong Institutions	People	10	3	580	34	24	651	9%	2%	3,1	0,5	0,3	-0,3
17. Partnerships for the Goals		4	2	465	71	73	615	23%	1%	3,3	0,7	0,5	0,0

# Importance, ability & action



# Importance, ability & action



# Our future society / city



(Warner Bros. Pictures 2017)

# Why should you care about the SDGs

- we have an obligation to do it!
- it is motivating. *Purpose* is along with *Mastery* and *Autonomy* key drivers of motivation
- it enables collaboration between various disciplines and organizations
- it sets the directions for our activities
  - What legacy do I want to leave?
  - What projects should I engage in?



# Thank you and stay in touch!

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LinkedIn: [www.linkedin.com/in/cthuesen](https://www.linkedin.com/in/cthuesen)

X: [@cthuesen](https://twitter.com/cthuesen)

## Resources:

[www.technologycards.net](http://www.technologycards.net)  
[www.doing-projects.org](http://www.doing-projects.org)



UN Photo/Cia Pak

# Selected references

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