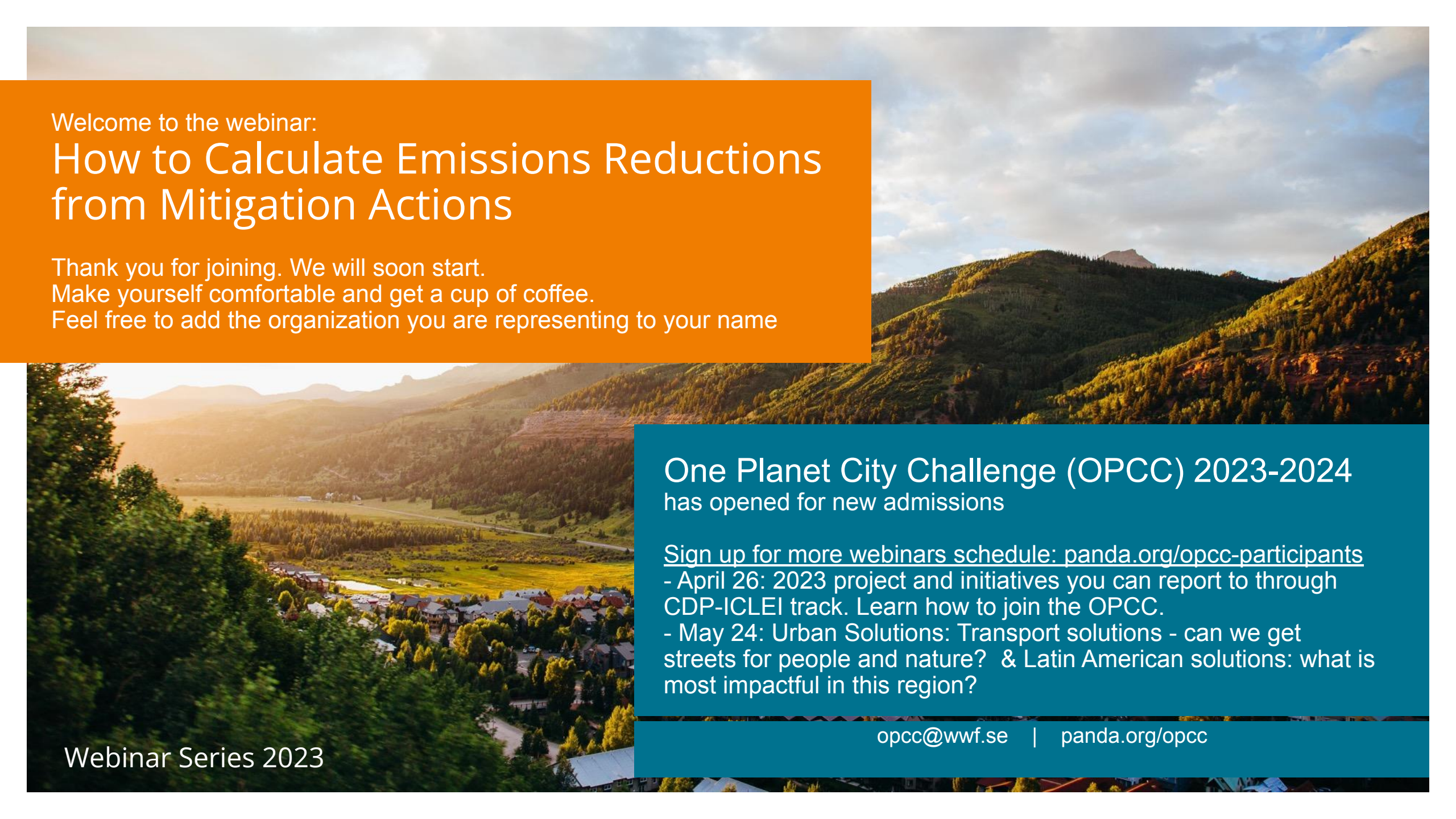




Welcome to the webinar:

How to Calculate Emissions Reductions from Mitigation Actions

Thank you for joining. We will soon start.

Make yourself comfortable and get a cup of coffee.

Feel free to add the organization you are representing to your name

One Planet City Challenge (OPCC) 2023-2024
has opened for new admissions

Sign up for more webinars schedule: panda.org/opcc-participants

- April 26: 2023 project and initiatives you can report to through CDP-ICLEI track. Learn how to join the OPCC.

- May 24: Urban Solutions: Transport solutions - can we get streets for people and nature? & Latin American solutions: what is most impactful in this region?

Webinar Series 2023

opcc@wwf.se | panda.org/opcc

Logistic checks



- Please add in **your name which city** or organization you are representing
- Please keep yourself **muted**
- We have **interpretation:** Spanish/English
- Tenemos interpretación: Castellano/Ingles
- Please **use the chat** to introduce yourselves, ask questions, exchange information among you!



Presenters

Victoria Olausson – Global Lead WWF OPCC
Björn Sigurdson – Senior Advisor to WWF,
Sustainable Advantage AB.
Caroll Owen, Peñalolén, Chile

Today's Agenda:

- * Welcome and introduction
- * Crash Course on how to calculate/estimate impact of mitigation actions:
- * City example
- * Q&A



Time to (re-) join the OPCC



ONE PLANET
CITY CHALLENGE

4.4★

average rating



- We aim to **democratize global scientific results** (i.e. IPCC) and make them easily accessible to **all** local government, in our **individualized Feedback Report**
- Join by **reporting to a standardized international platform** (CDP-ICLEI).
- This opens up the **global cities arena**, and allows you to 'stand up' and be counted in support of the Paris Agreement and the global climate negotiations.
- We **celebrate frontrunners** through **solutions stories**, and use them as a tool to accelerate the climate transition.
- **We collaborate and align with other city networks** such as the Global Covenant of Mayors, ICLEI, C40 & CDP
- Participant survey: **83%** like to join again. **86%** recommend to others

Global webinars to support your City mitigation strategic work



Webinars Connect to the 5 Themes of OPCC Assessment Framework - Strategic Planning Process - Mitigation in this case.

There is also an equivalent Strategic Planning Process for Adaptation



Introduction – when to calculate

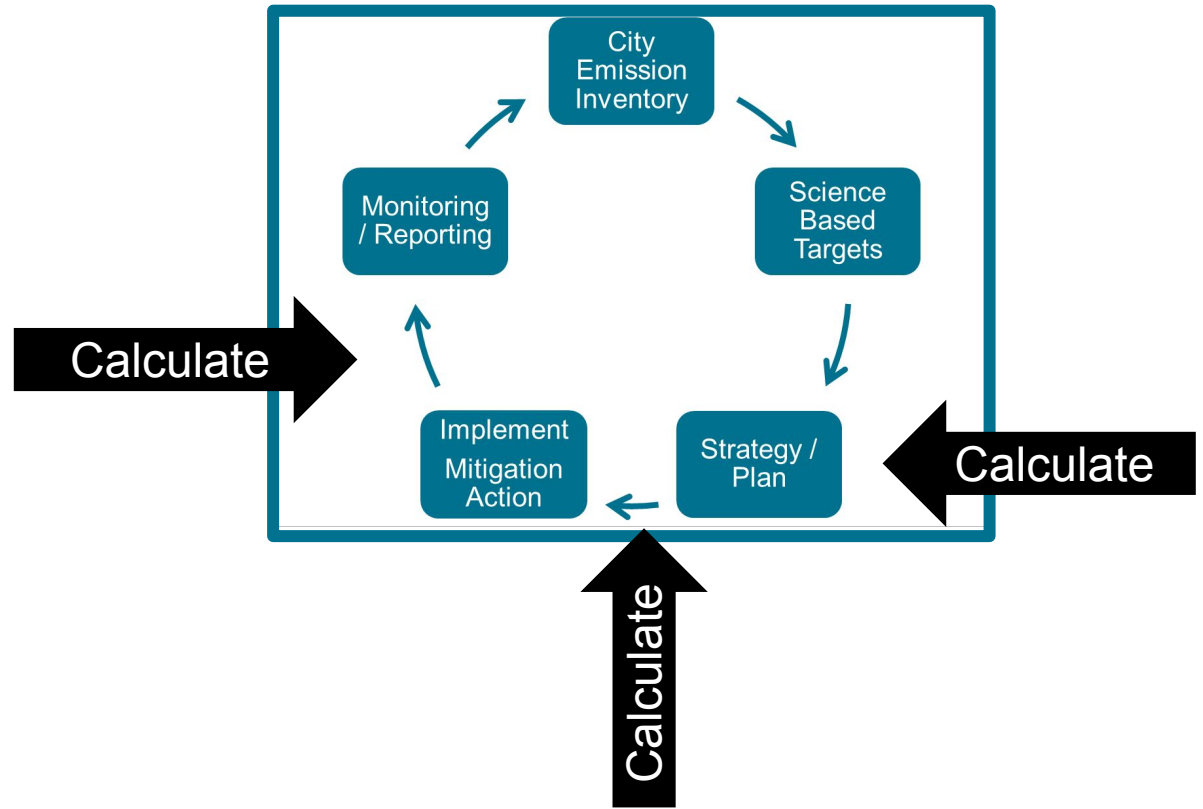


This is a Crash Course on how to calculate or estimate impact of mitigation actions in a standardized way.

(in metric tonnes CO₂e per year)

Calculate emissions reductions of actions to ...

- to consider and evaluate different actions
 - in order to build your Mitigation Plan
 - to meet your Climate Mitigation Target
- to present your chosen actions in your Action Plan and summarize the total reduction of all actions
 - to show how much the Action Plan is estimated to contribute to close the gap between your City Emissions Inventory Baseline and your Science-based Climate Target
- to follow-up the Action Plan and evaluate further actions
- to report emissions reductions to WWF OPCC



**WWF OPCC ask your city
through the CDP-ICLEI Track: Module Actions
(Question 9.1)
Describe the outcomes of the most significant
mitigation actions your jurisdiction is currently
undertaking or planning.**

Calculate emissions reductions of actions:

1. Global standard to use
2. Different kind of Actions
3. Basic method + example
4. Other impacts!
5. City guest presentation
6. More to think of + Wrap up

Standard Method to calculate / estimate impact



Used / Recommended Standard:

Greenhouse Gas Protocol – World Resources Institute (WRI)

“Policy and Action Standard”

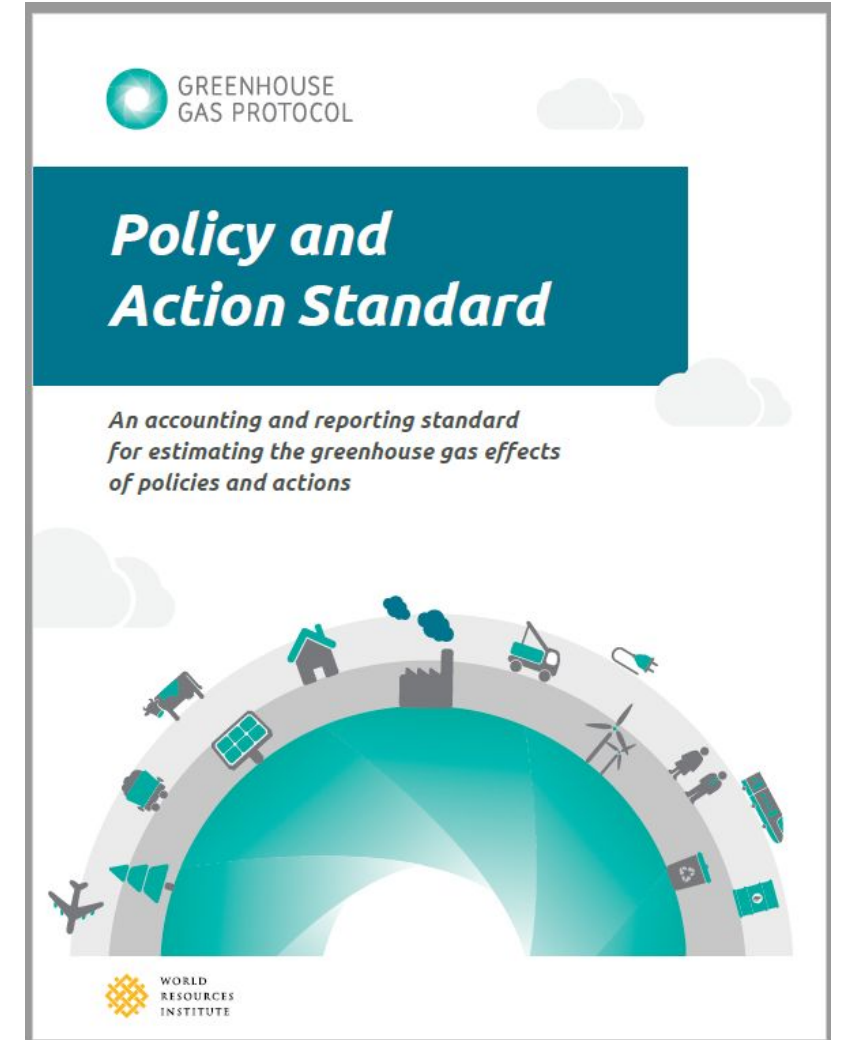
- Accounting and reporting standard and Guide
- For geographical level action estimates / evaluation
= city/community wide level
- Works for every level of government in all countries
- Works for any kind of action or policy

Additional helpful standard:

Mission Innovation

- Estimate impact from an innovation on a market scale

<https://misolutionframework.net/>



What climate mitigation action?

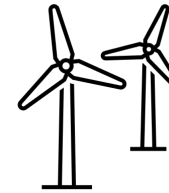
Step A: Choose an action type:

There is a list of standard actions
- [Appendix C – CDP-ICLEI Track].
Or choose "Other, please specify"

Appendix C

Action group (= Primary emissions sector in the Emissions Inventory addressed):

- Stationary energy (Sector 1)
- Transportation (Sector 2)
- Waste (Sector 3)
- Industrial Processes and Product (Sector 4)
- Agriculture, Forestry and Land Use (Sector 5)
- Generation of grid-supplied energy (Sector 1-2)
- Food (Sector 1, 2, 5)
- Other sectoral action (Sector 1, 2, 3, 5)
- Other, please specify (Sector ?)



Depending on type of action –
more or less easy to estimate or calculate
emission reductions.

Ex: easier, one-to-one action

Sector 1 or 2:

Action: "On-site renewable energy generation"

Action: "Low or zero carbon energy supply generation"



Ex: trickier, more factors to consider

Sector 2:

Action: "Improve walking, cycling and integrated transit access"

Standard method – example Energy conversion



Sector 1: Action: "Renewable power generation"

Situation BEFORE - Pre Action:

There is a power plant in the city fuelled by coal.

Action:

Shutting down coal power plant replacing it with wind and solar power.

Situation AFTER - Post Action:

Electricity produced by solar and wind (situated in the city).

Before (minus) After = IMPACT CO₂e and other

CO₂e Impact (examples):

depending on system boundaries (Scope 1-2-3)

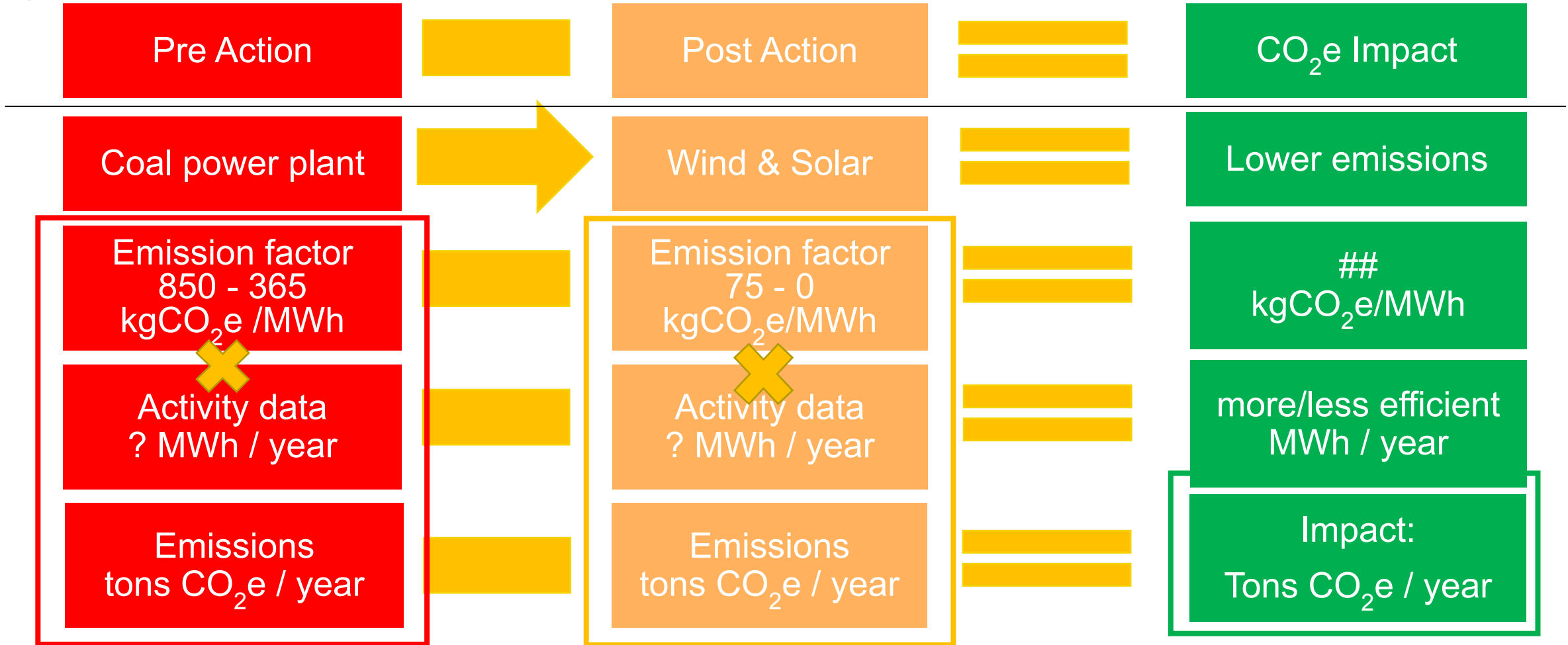
Other impact:

- ☐ **system impact**
(ex) creating new renewable energy industry
- ☐ **rebound** – something unwanted / unrelated happens

(ex LED-lights): lower energy use -> saves money -> money used to other purposes that use more or dirtier energy
- ☐ **Co-benefits:** (ex) no dependency on coal, no air pollution
- ☐ **Losses:** (ex) dependency on rare minerals for solar power
- ☐ **Conflict of interest:** (ex) wind turbines negative visual and hearing impact
- ☐ **Energy:** Annual energy savings (MWh/year)
Annual renewable energy generation (MWh/year)

Emissions	Scope 1	Scope 2 (Grid-energy use)	Scope 3 (or Scope 2)
Pre Action	(medium) In-city transport of coal	(major) Burning of coal	(medium?) Coal-mining + transport
Post Action	(small) In-city transport of maintenance	(small) Maintenance of wind and solar utilities	(medium?) Mining for rare metals and production of panels + transport

Basic method – schematic overview / example



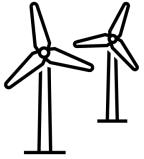
This is an simplified example to show the basic idea of how to calculate. You might want to include more factors to consider more circumstances giving rise to or reducing other kind of related emissions. You might want to do different kind of calculations, that is include more or less of emissions sources, depending on what you will use the calculation to. For the purpose of CO2e impact reporting for OPCC please use same system boundaries as your Emissions Inventory.

Rebound

Co-benefits
(f.ex health)

Conflict of Interest Impact

Data and data-sources



Action: "Renewable power generation"

You need to know:

1. Activity data

- The amount of energy/electricity produced (MWh/year)

2. and the emission factor

- for fossil coal (kg CO₂e/MWh)

2a). Only end-of-pipe emissions - usually Scope 1 and Scope 2 emissions

2b) Up-streams emissions or Life-cycle emissions - usually Scope 3 emissions. Only include if you have Scope 3 emissions in your Emissions Inventory.

Activity data

is a quantitative measure of a level of activity that results in GHG emissions taking place during a given period of time. E.g.:

- volume of gas used,
- kilometres driven,
- tons of solid waste sent to landfill.

Where to find what you need:

1. Total energy production (MWh/year)

- Local data / Utility data
- National Energy Agency

2. Emission factor for different fuels (kg CO₂e/MWh)

(b) end-of-pipe emissions

- National Environmental Agency
- IPCC

(b) up-stream emissions

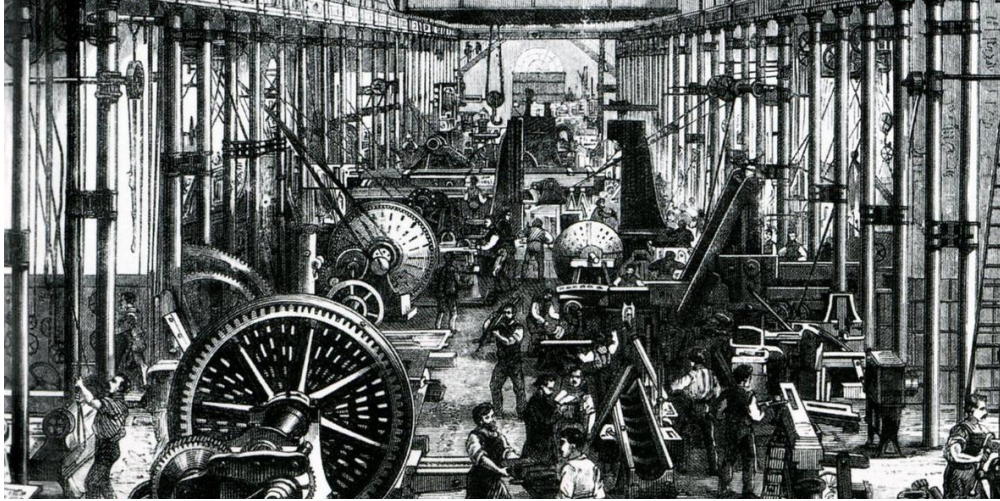
- National Environmental Agency
- Different handbooks

Cálculo de la reducción de emisiones: acciones de mitigación

**Municipalidad de
Peñalolén**
Caroll Owen

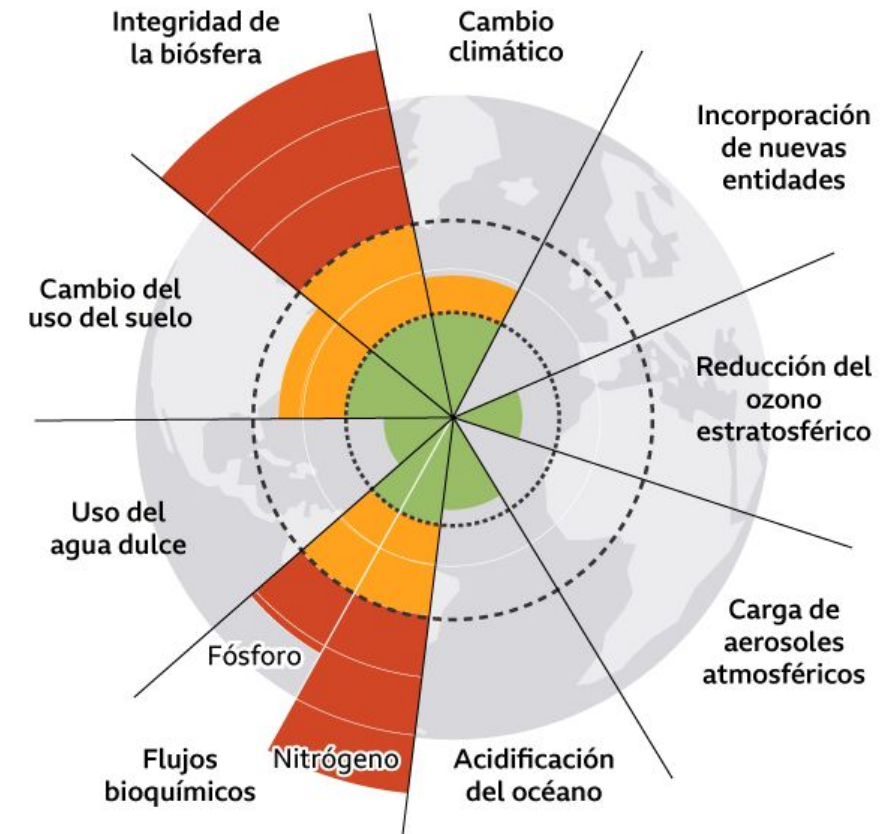


Crisis mundial: ¿En qué estado nos encontramos?



Los 9 límites planetarios

■ Zona segura ■ Zona de riesgo creciente ■ Zona de riesgo alto



Fuente: Centro de Resiliencia de Estocolmo

BBC

Priorización en la gestión

Carolina Leitao
Álvarez-Salamanca,
Alcaldesa Municipalidad
de Peñalolén.



Objetivos climáticos

Metas concretas



Mitigación

Carbono neutral al 2050
– Aceleración al 2030.



Adaptación

Reducción huella
hídrica de un 30% al
2030.

Otras:

- Fomento a un medio ambiente sano
- Conservación de la biodiversidad local
- Movilidad sostenible comunal
- Cuidado red hidrográfica
- Fomento de la justicia climática
- Cultura de colaboración y educación ambiental
- Comuna “Una Salud”
- Basura Cero

Instrumentos de gestión- Política Ambiental



Equipo Técnico- Dirección de Medio Ambiente



(55 + 8
refuerzos)

63
PERSONAS

**Dirección de
Medio Ambiente**

**Unidad de
acción climática y
estrategias ambientales**

**Departamento
Zoonosis
e Higiene Ambiental**

**Depto. Educación
Ambiental y Programas
para la Sustentabilidad**

**Depto. Gestión de Parques
Comunales y Conservación
de la Biodiversidad**

Acercamiento a la medición

Alta prioridad, alto compromiso, múltiples proyectos y un equipo especializado.

La necesidad de comprender si vamos por el camino correcto....



Cuantificación de la reducción de carbono



Consideraciones

- Orden y registro de las estimaciones: trazabilidad y transparencia.
- Fuentes oficiales y calidad de los datos: confiables y fidedignos.
- Supuestos utilizados fundamentados y objetivos.
- Adaptación a la realidad y territorio: identificación de necesidades **y que la imperfección no sea un impedimento.**
- Sistema de revisión permanente: abiertos al error y mejora continua.
- Validación y revisión: garantía de calidad.
- Verificación: proceso iterativo.



Reducción emisiones

Etapas de la cuantificación



1. Identificación de proyectos por cada área de mitigación.
2. Recopilación de toda la información útil asociada.
3. Conversión a CO2 equivalente.

Reducción de emisiones

Áreas



Residuos



Biodiversidad



Energía



Educación



Sector energía



Ejemplo 1: Paneles solares comunales

Solicitud de potencial
de energía instalada:
1.257,87 kW
(SEC).

Factor de
conversión:
1 kWp – 1.490
kWh/año.
(energia.gob).

FE:
0,346 TON CO₂ eq/MWh
(SEN).

$$1 \quad \frac{1.257,87 \text{ kW} \times 1.490 \text{ kWh/año}}{\text{Kw}} = 1.874.226 \text{ kWh/año}$$

$$2 \quad \frac{1.874.226,3 \text{ kWh/año}}{1.000} = 1.874,2 \text{ MWh/año}$$

$$3 \quad \frac{1.874,2 \text{ MWh/año} \times 0,346 \text{ TON CO}_2\text{eq}}{\text{MWh}} = 648,5 \text{ TON CO}_2\text{eq/año}$$

$$4 \quad 648,5 \text{ TON CO}_2\text{eq/año} \\ \text{– emisiones que genera.}$$

Sector energía



Ejemplo 2: Recambio LED colegios

Se utilizó como fuente base los m2 intervenidos del proyecto calculado por empresa, con su equivalencia a Kwh/año

Establecimiento		M2	Factor Conversión	Kwh/a
JBP	Escuela Juan Bautista Pastene	4371,68	1,00	17.179
Led Colegios				
Establecimiento		M2	Factor Conversión	Kwh/a
JBP	Escuela Juan Bautista Pastene	4371,68	1,00	17.179
CEEE A	Liceo Erasmo Escala Arriagada	2768,52	0,63	10.879,21
CEVH	Centro Educacional Valle Hermoso	3578,05	0,82	14.060,34
UNA	Escuela Unión Nacional Árabe	3543,62	0,81	13.925,05
SMP	Escuela Santa María de Peñalolén	3247,56	0,74	12.761,65
ALI	Colegio Alicura	712,28	0,16	2.798,98
LIK	Colegio Likankura	2411,9	0,55	9.477,83
LAC	Escuela Luis Arrieta Cañas	2633,04	0,60	10.346,82
CEME	Centro Educacional Mariano Egaña	6624,48	1,52	26.031,63
TOB	Escuela Tobalaba	3560,93	0,81	13.993,07
MHN	Escuela Matilde Huici Navas	2229,04	0,51	8.759,26
LAHF	Liceo Antonio Hermida Fabres	9631,85	2,20	37.849,42
CFP	Escuela Carlos Fernandez Peña	4210,06	0,96	16.543,90
JPII	Escuela Especial Juan Pablo II	1429,06	0,33	5.615,65
	Centro Educacional Eduardo de la			

Con esta información, más los m2 intervenidos con recambio LED de cada establecimiento, se pudo extrapolar a los otros recintos.

Se resta a los Kwh/anuales consumidos anteriormente y la diferencia se multiplica por el FE específico.

Sector biodiversidad



Ejemplo 2: Captura bosque nativo

Hectáreas de
bosque nativo

Peñalolén: 1.500 Ha.
(google earth).

Bosque según ley Chile
cobertura sobre el 10%.

Factor de cobertura x 0,6.
(google earth).

1 hectárea de BN
esclerófilo captura
6 TON CO₂/año
(Uch).

1

1.500 Ha X 0,6 = 900 Ha de bosque nativo

2

900 x 6 TON CO₂/año = 5.400 TON CO₂/año

Resumen de reducción



Indicadores Dirección Medio Ambiente 2021						
N°	Tema	Indicador	Unidad de medida	Cantidad 2021	Cantidad acumulada	TON CO2 eq/año) 2021
1	Residuos	Residuos recuperados inorganico reciclaje y reutilizado	Toneladas	1.600,0		
2	Residuos	Aceite recuperado en la comuna	Litros/año	65.919,0		
3	Residuos	Residuos orgánicos totales (Composteras + Eco)	Toneladas	180,0		
4	Biodiversidad	Superficie de áreas verdes comunales	Hectáreas	1,8		0,1
5	Biodiversidad	Superficie de áreas silvestres (bosque nativo)	Hectáreas	-	1500	5.400,0
6	Biodiversidad	Árboles plantados	N° arboles	906	2768	18,1
7	Educación	Personas capacitadas totales	Personas	6490	24499	302,4
8	Energía	Recintos Educativos	KwH/a generado o ahorrado	2.402,6		846,3
9	Energía	Centros de Salud	KwH/a generado o ahorrado	105.674,0		39,0
10	Energía	Centros Deportivos	KwH/a generado o ahorrado	1.190.318,0		242,9
11	Energía	Municipio y corporaciones	KwH/a generado o ahorrado	10.890,5		3,8
12	Energía	Privados	KwH/a generado o ahorrado	1.549.970,0		536,3
13	Energía	Luminaria	KwH/a generado o ahorrado	4.602.234,0		1.592,4
14	Energía	Revestimiento	KwH/a generado o ahorrado	974.671,4		337,2
15	Energía	Kit energía	KwH/a generado o ahorrado	613.139,2		212,1
16	Energía	Ciclovías				
17	Energía	Corredor eléctrico				
						9.530,7

¿Por qué contabilizar?

La importancia de avanzar



La reducción de CO2 es “una carrera de largo aliento”, por lo tanto debo ir midiendo permanentemente los kilómetros avanzados y revisando si estoy en el sentido y dirección correcta. Esta es la única manera de mejorar mi ritmo, reenfocarme y llegar a la meta.



- Concretar los compromisos.
- Visibilizar y reconocer los avances.
- Mejorar la gestión.



Peñalolén
Crece para tod@s

Mitigación y reducción huella de carbono

**Municipalidad de
Peñalolén**

Caroll Owen
cowen@penalolen.cl

WHO Tool HEAT

– estimate impact of more biking / walking action



Action: "Improve walking, cycling and integrated transit access"

If [x] people regularly walk or cycle an amount of [y] km's/trips:

- what are the health impacts on premature mortality and their economic value?
- what are the mortality effects of exposure to air pollution and traffic crashes?
- how much lower carbon emissions from shifting travel by motorized modes to walking or cycling?



Easy to work with, even with only basic knowledge of travel habits.

Work with general figures or city specific.

Although emission factors for greenhouse gases from vehicles cannot be changed – it will give you a good idea of the magnitude.

Direct emissions from fuel used, up-streams emissions from fuel production, and emissions from production of the vehicle itself.

<https://www.heatwalkingcycling.org>

Time aspect of Actions – long-term impact



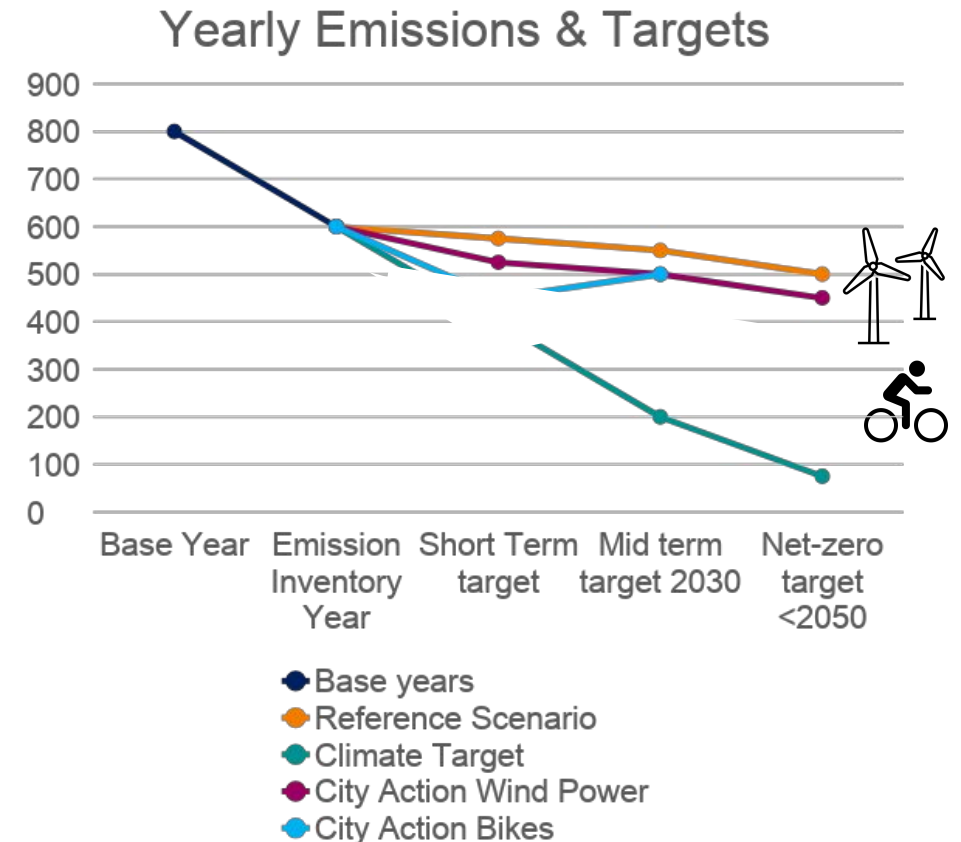
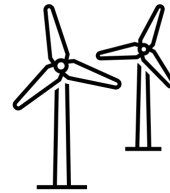
After calculating / estimating emission reductions

You need to determine the time aspect – for how long will the result/impact of your action last?

And how does this relate to your Base-line and Climate target?

Two likely cases (A-B):

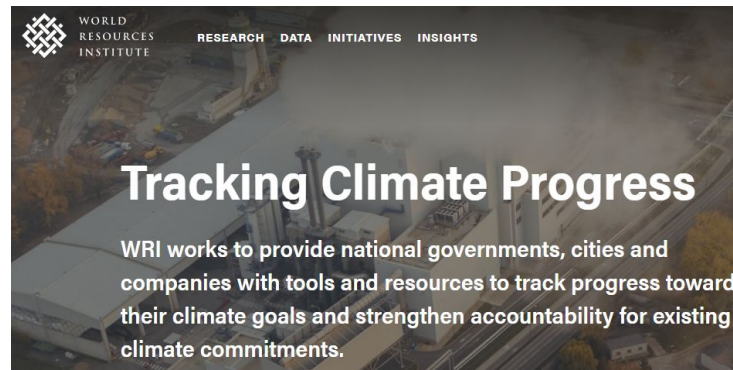
- A. The change will in principle not be reversed.
 - The City annual emissions will permanently go to a lower level (violet line)
- B. The impact of the intervention will last during X years, and then you need to intervene again.
 - The City annual emissions will go down for a certain number of years (blue line) – then it will stay at that level or even increase again.



Help – Resources & Tools

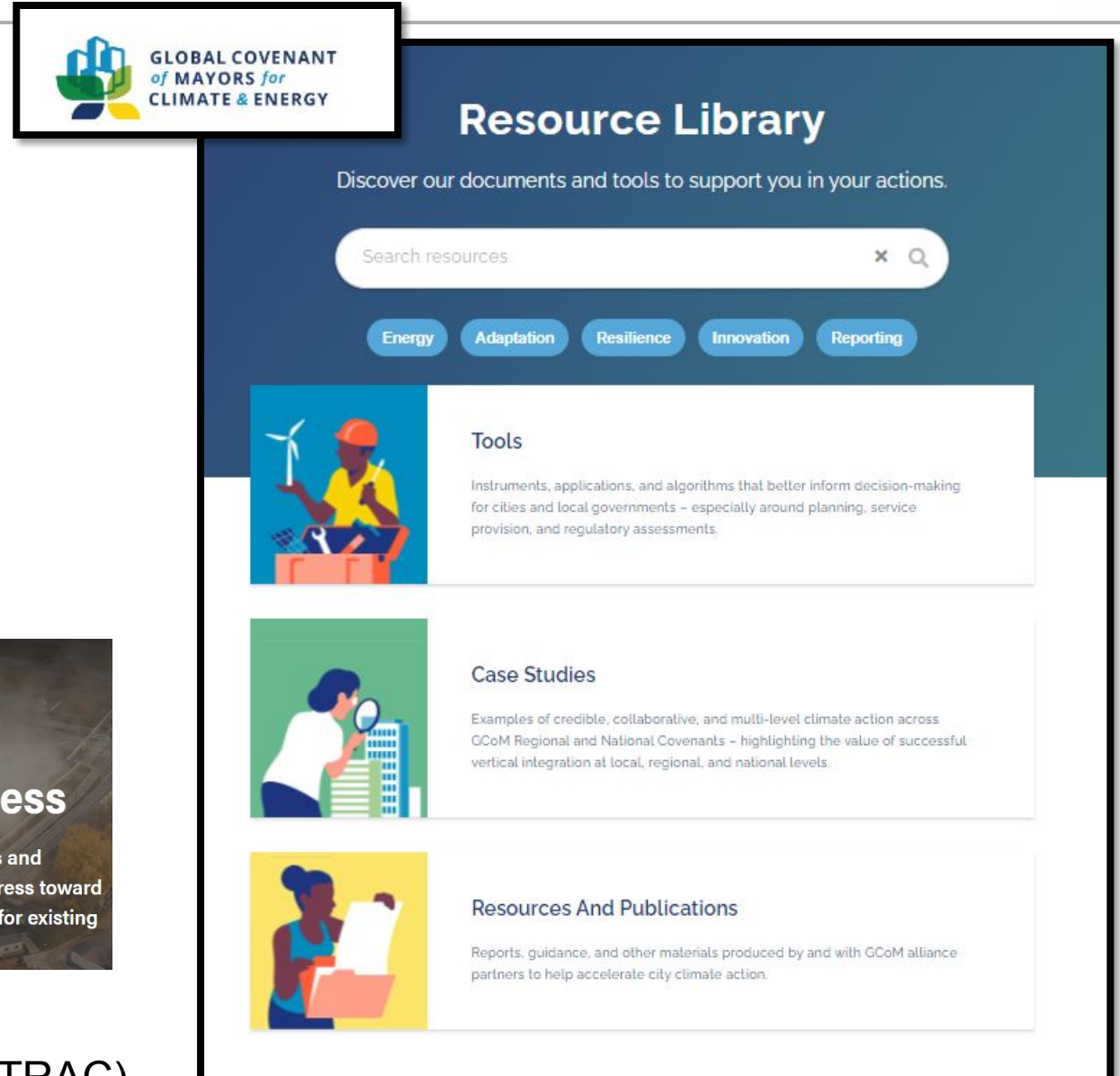


- World Resources Initiative (WRI)
- Global Covenant of Mayors (GCoM)
- National or Regional Government Agencies for statistics and other stuff
- Work with other departments in your city
- Universities
- Consultancies
- Digital tools



World Resource Initiative (WRI)

- WRI's Tools, Reporting, and Analysis for Climate (TRAC)



Actions need to match City Emissions Inventory



Standard Emissions Inventory 1 year:

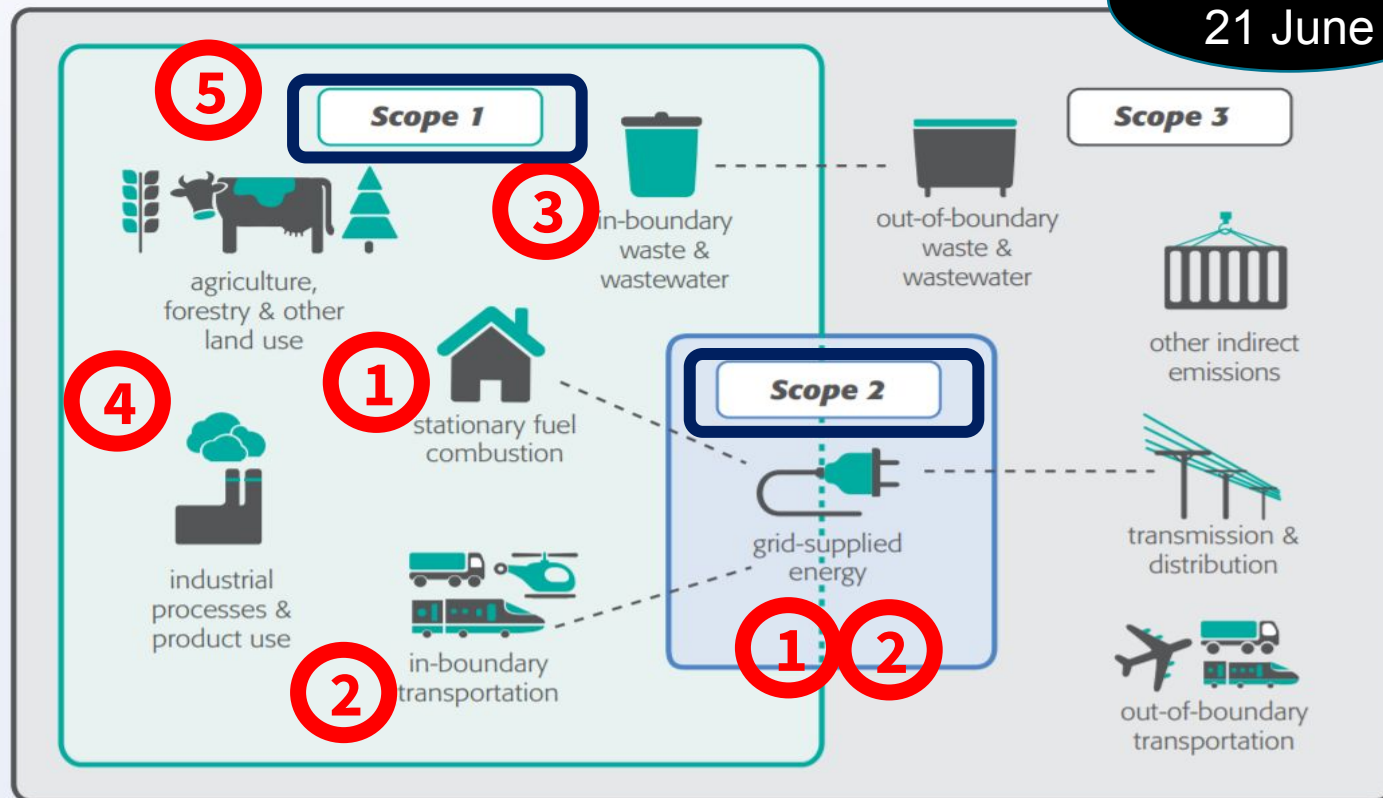
Scope 1-2(-3), Sector 1-2-3-4-5, 7 Greenhouse gases

WRI, C40, ICLEI: Global Protocol for Community-scale Greenhouse Gas Emission Inventory (GPC)

Global Covenant of Mayors: Common Reporting Framework (CRF)

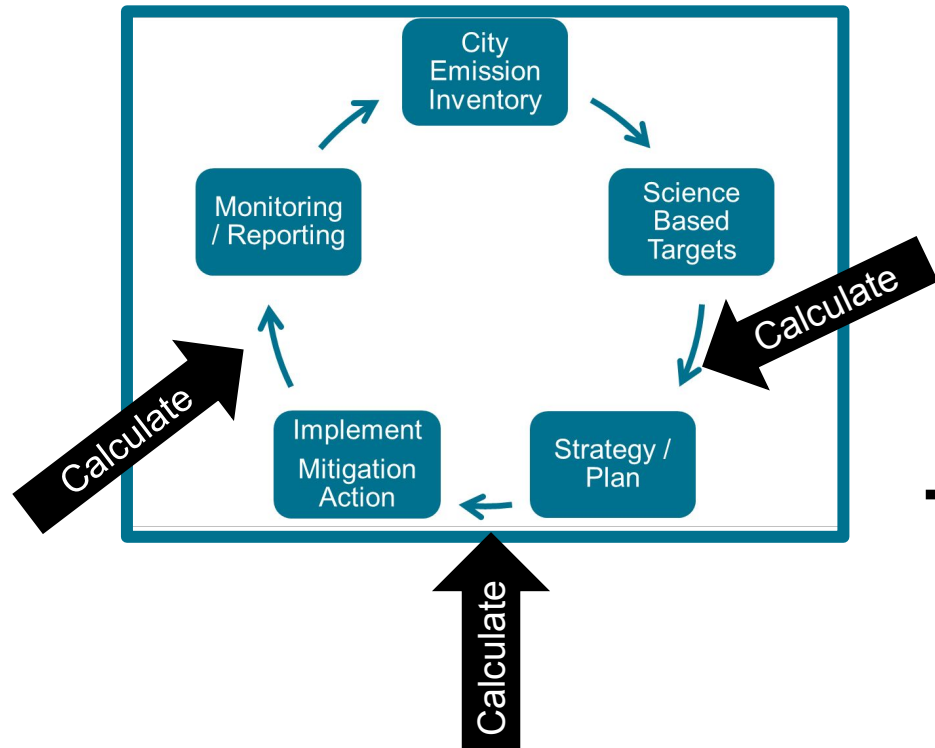
Match Actions with Reported Emissions

Figure 1 Sources and boundaries of city GHG emissions



- Match Significant Emission Sectors with Significant Actions.
- Develop Actions for each Sector.
- If your City does not have or do not report Emissions for a certain Scope/Sector/Greenhouse gas –
– you can not deduct the calculated emissions reductions of an action pertaining to that Scope/Sector/Greenhouse gas.
- Example: if no reported Scope 3 emissions, don't include up-stream emissions in your calculation of your mitigation action for the purpose of reporting to OPCC.

Wrap up - Final words



Summarize

- Summarize the total impact of your actions.
- Estimate the remaining gap towards the target
- and consider further actions to close the gap.

Think twice !

- Don't double count
 - It matters in which order you calculate your actions
- For example, the combination of
- Renewable Energy action and
 - Energy Efficiency action

Just do it!

- It is better to start with some figures, than no figures!
 - These can be challenged & improved
- Ask for help, co-operate, exchange!
- Good luck!

Thanks 😊

bjorn.sigurdson@sustainableadvantage.io



Upcoming webinars

April 26 – 2023 project and initiatives you can report to through CDP-ICLEI track. Learn how to join the OPCC

May 24 - Urban Solutions:

- * Transport solutions: can we get streets for people and nature?
- * Latin American solutions: what is most impactful in this region?

June 21 - Emissions Inventory

Join the journey and inspire the world

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together possible™



Working to sustain the natural world for the benefit of people and wildlife.

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