

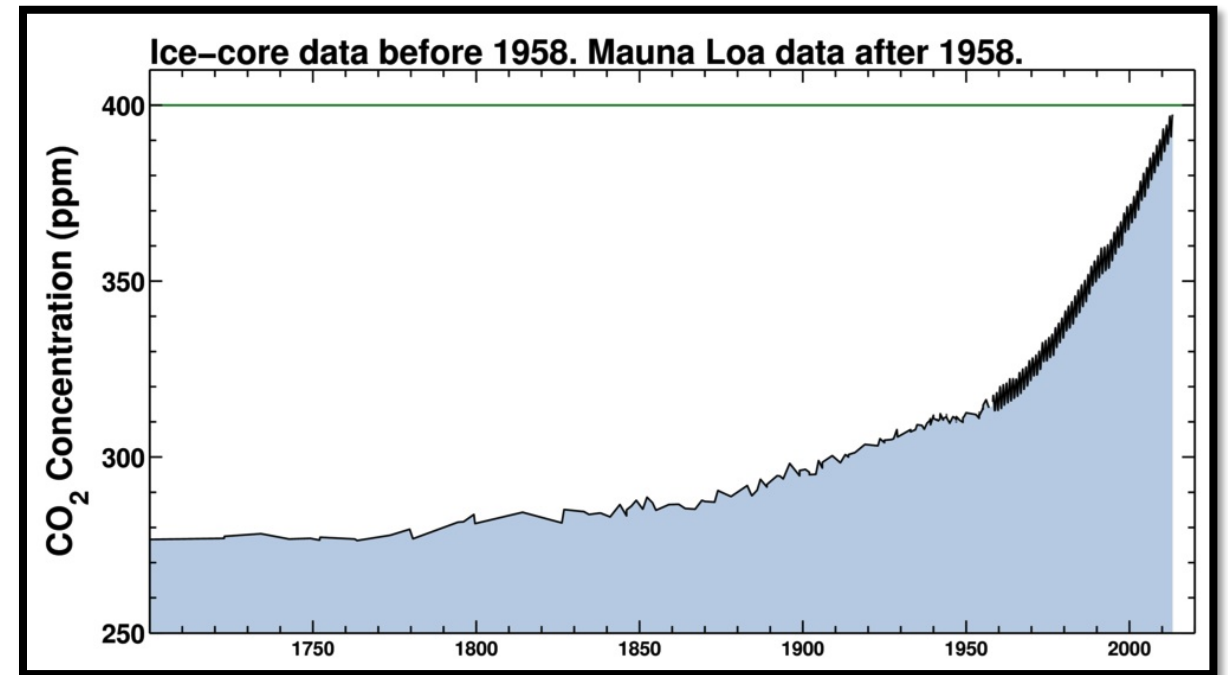
Decarbonizing the Environment: Reduction of CO₂ Concentration in the Atmosphere

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Environmental pollution: “*Early human Impact on global atmosphere*” [1]

Introduction

- ❑ The environmental pollution caused by carbon dioxide (CO₂) emissions is one of the main causes of global warming.

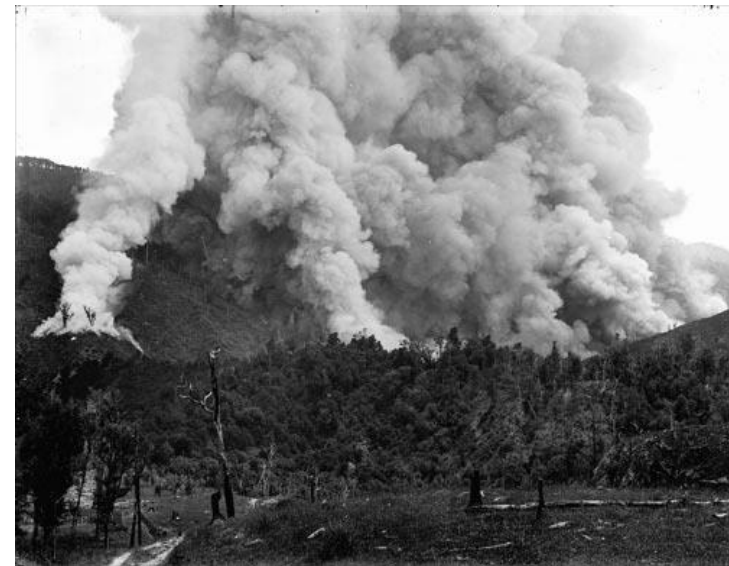


Evolution over the last 300 years of the CO₂ concentration in parts per million (ppm) in the atmosphere [1].

Environmental pollution: “*Early human Impact on global atmosphere*” [1]

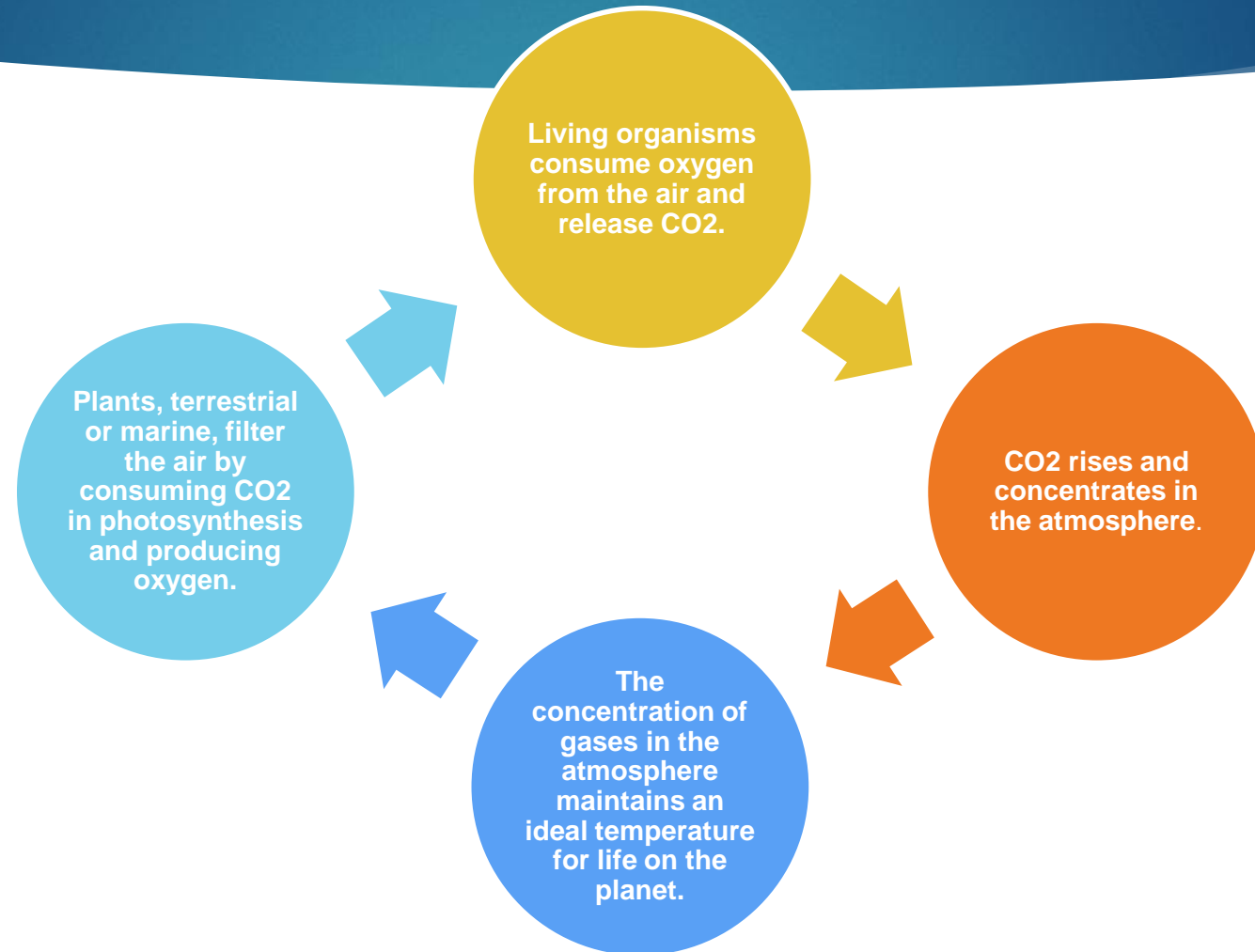
Introduction

- ❑ A report by the Desert Research Institute (DRI) and the British Antarctic Survey found traces of black carbon in Antarctic ice from Māories land-burning practices in New Zealand [2].
- ❑ The CO₂ released into the atmosphere polluted much of the southern hemisphere and condensed as black carbon (CO₂ in solid state) in Antarctic ice [2].

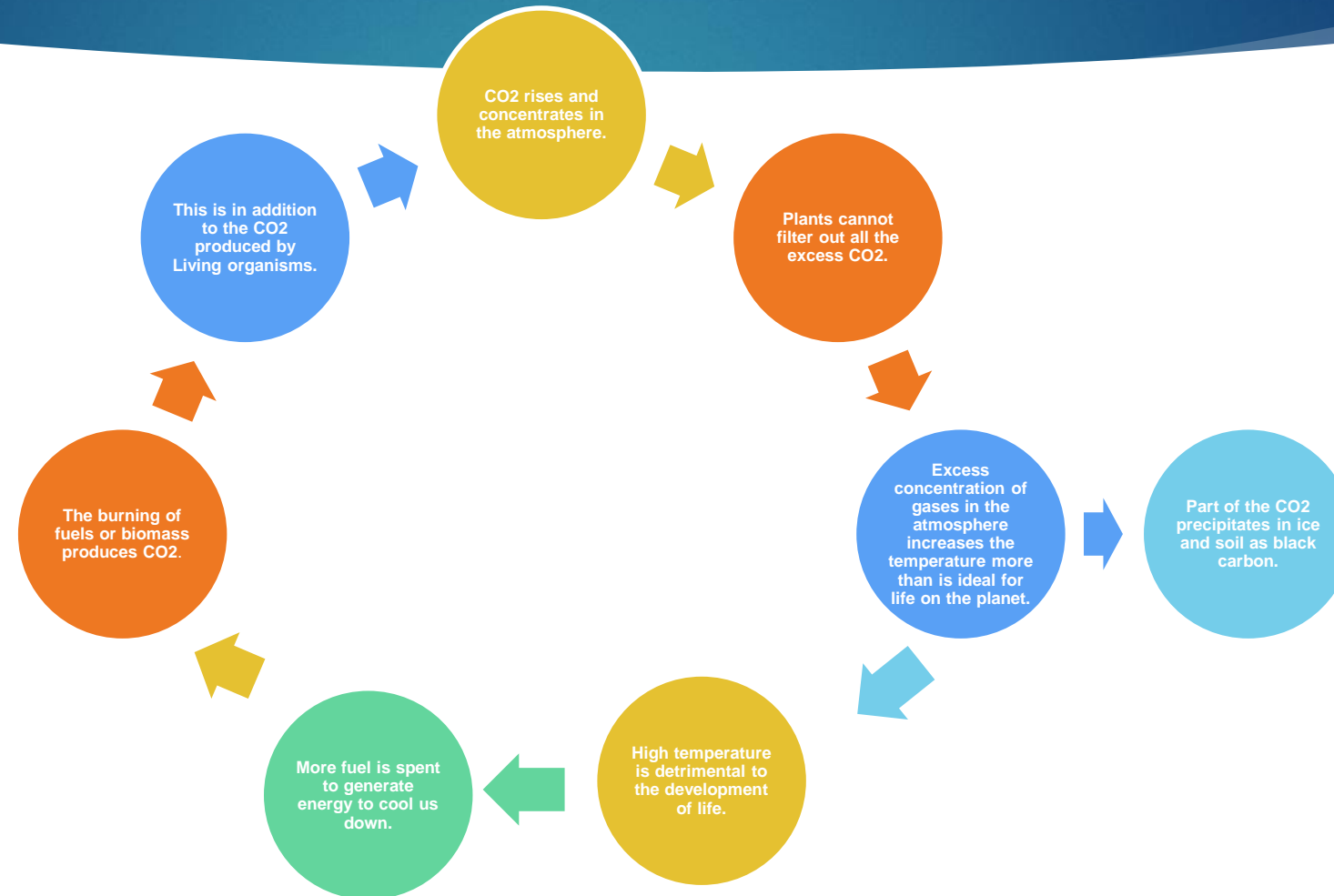


Land-burning in New Zealand [3].

CO₂ Natural Cycle



CO₂ cycle modified by human action

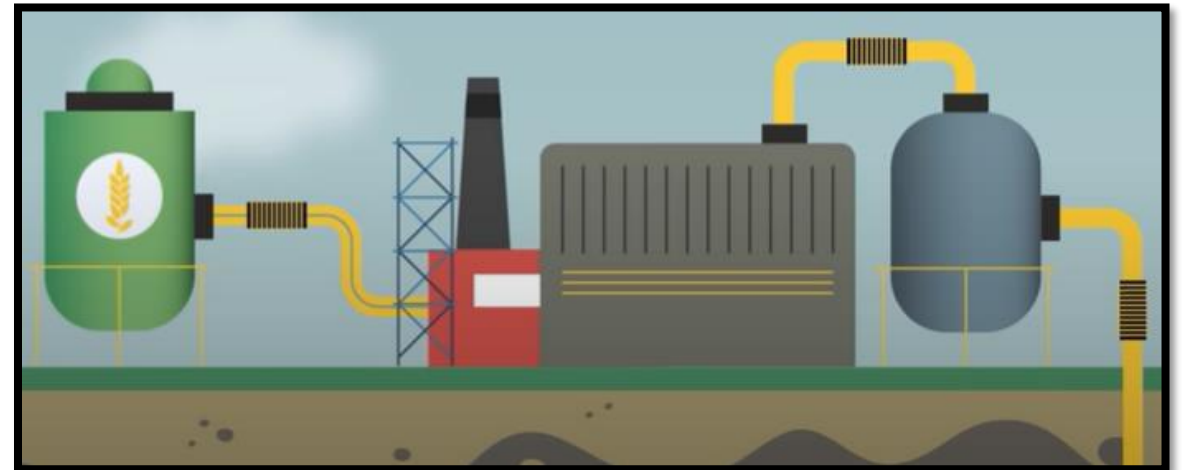


Map of the Presentation

- ▶ **CO₂ Capture, Re-injection and Re-use Methods:**
 - ▶ Four possible solutions to mitigate the problem of CO₂ concentration in the atmosphere.
 - A. BIOENERGY WITH CARBON CAPTURE AND STORAGE.*
 - B. SELECTIVE REFORESTATION.*
 - C. DIRECT CAPTURE OF CO₂ FROM THE AIR WITH REINJECTION INTO THE SUBSOIL.*
 - D. CO₂ RECOVERY FROM MAIZE ETHANOL DISTILLERY.*

BIOENERGY WITH CARBON CAPTURE AND STORAGE (BCCS)

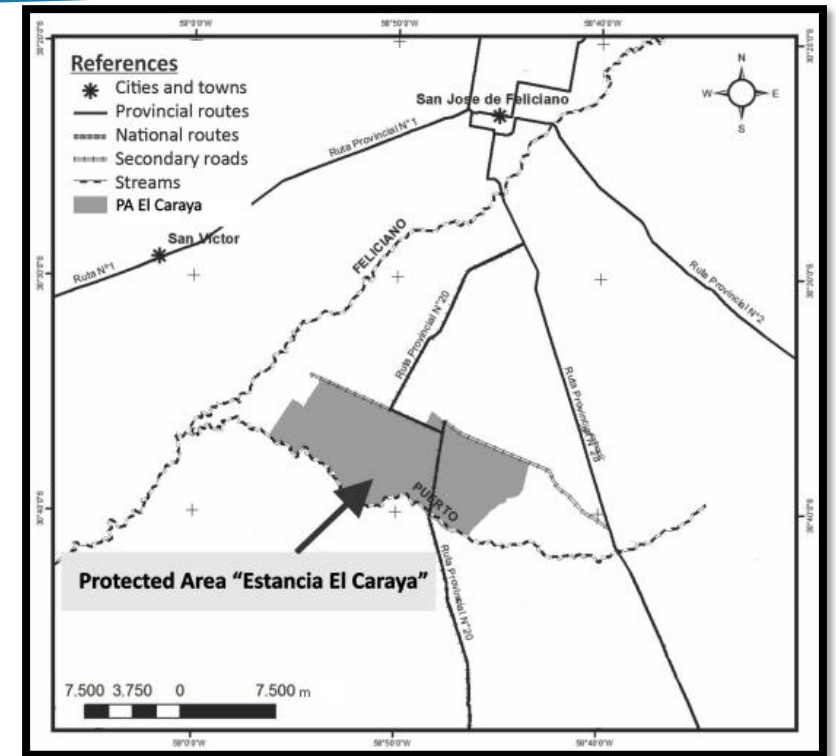
- ▶ It is a potential greenhouse gas mitigation technology that produces negative carbon emissions combining the use of biomass energy with geological CO₂ capture and storage [4].



Capture and re-injection of CO₂ produced at the end of the biomass combustion cycle into the subsoil [4].

SELECTIVE REFORESTATION

- ▶ This is a method to reduce the excess of CO₂ already present in the atmosphere through selective reforestation of native forests.



Protected area "Estancia El Caraya" [5].

DIRECT CAPTURE OF CO₂ FROM THE AIR WITH REINJECTION INTO THE SUBSOIL

- ▶ The Swiss engineering company “Climeworks” is the main operator of so-called Direct Air Capture (DAC) plants [6].
- ▶ The world's largest direct CO₂ capture plant is operating in Iceland and is expected to remove the CO₂ emissions of 870 cars per year from the atmosphere [6].



Orca, world's largest direct CO₂ capture plant [6].

CO₂ RECOVERY FROM MAIZE ETHANOL DISTILLERY

- ▶ This project proposes the recovery and storage of the CO₂ generated during the distillation process and its subsequent sale on the market [7].



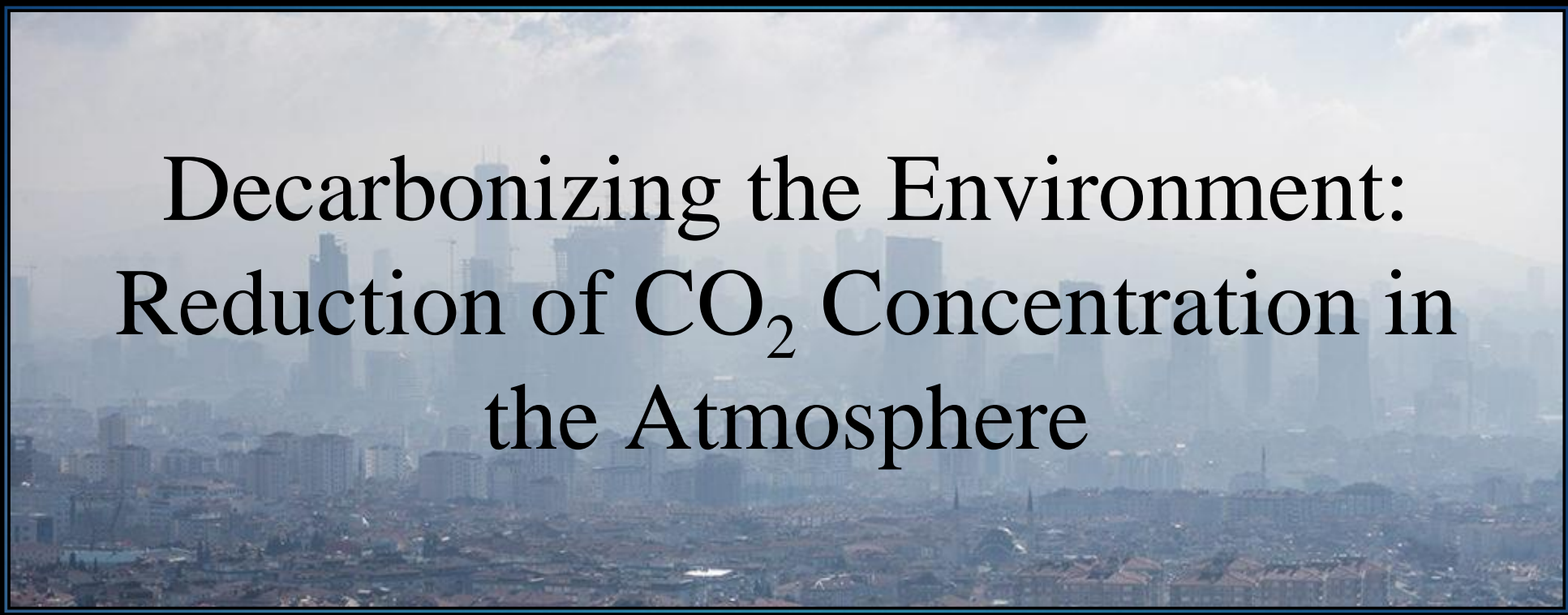
Conventional bronze distiller [8].

CONCLUSION

- From the four possible solutions presented for the problem of excess CO₂ in the atmosphere, we conclude that each has its advantages and disadvantages.
- As engineers we can work to improve these technologies.
- All the time, all over the world, new technologies are being developed to improve the quality of life of human beings.

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