CAETS 2021
ARGENTINA
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THE FUTURE OF ENERGY

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# Nature Based Solutions

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# IUCN defines nature-based solutions (NBS) as:

- '… actions to protect, sustainably manage and restore natural or modified ecosystems …effectively and adaptively, while simultaneously providing human well-being and biodiversity benefits' (Cohen-Shacham et al. 2016).

## Document in Preparation: CAI – ANI 2021

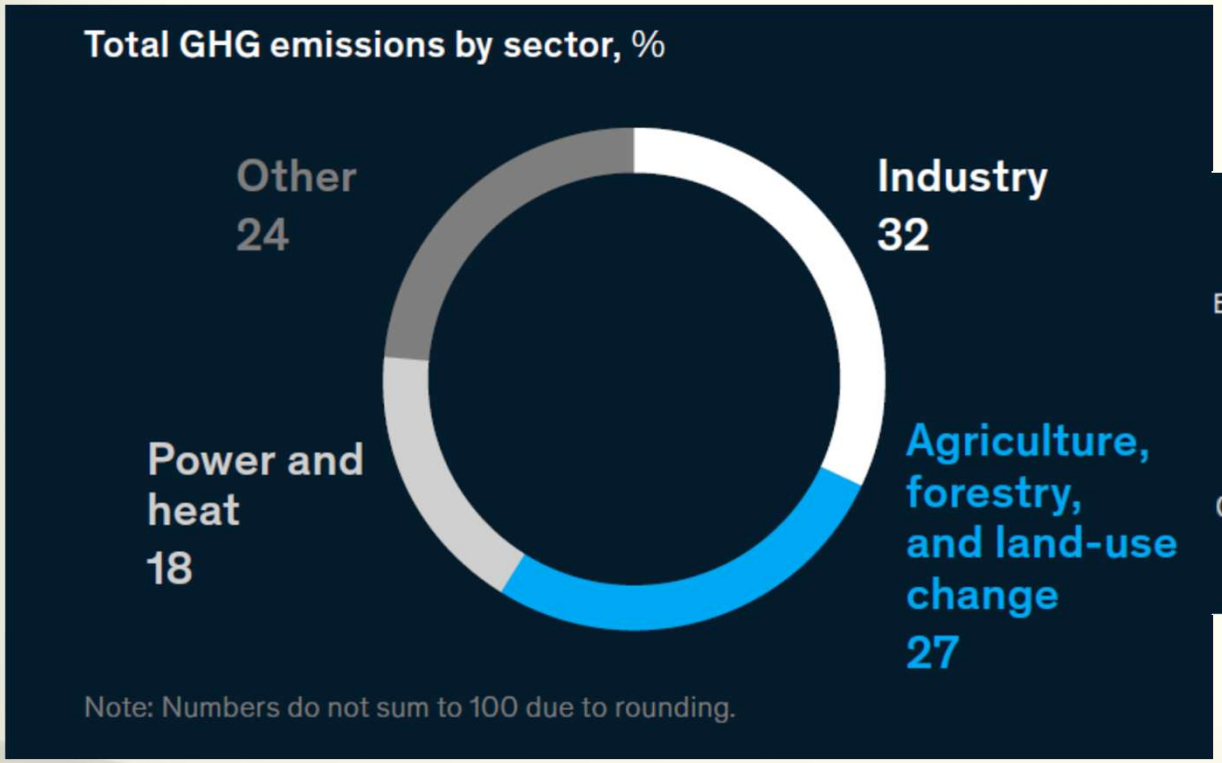
## "CONSIDERATIONS ON POSSIBLE INSTITUTIONS AND REGULATION TO ACHIEVE AN EFFICIENT TRANSITION OF THE ARGENTINE ENERGY INDUSTRY BY 2050."

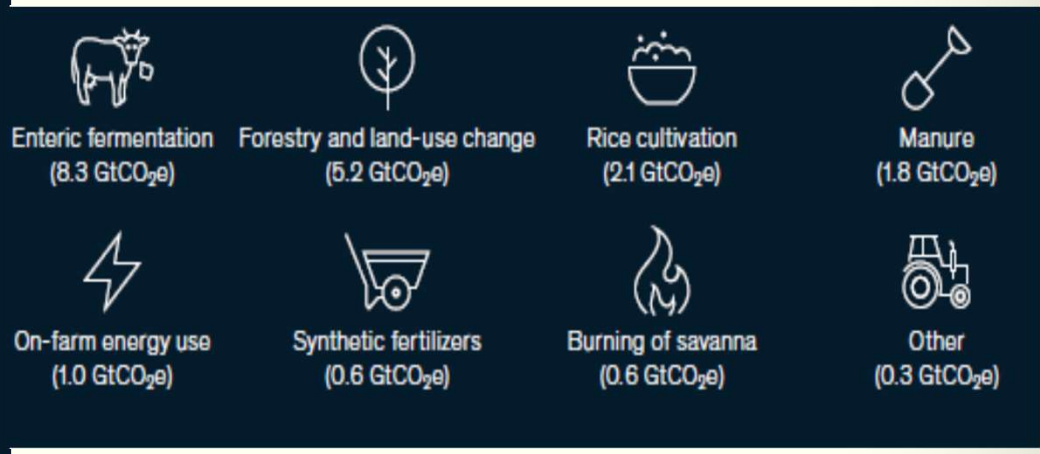
- Transition towards a 2050 Scenario of net Zero Emissions. Transforming the Energy Matrix with Renewable Sources, Nuclear Energy and Natural Gas. Mitigating emissions and sequestering carbon through "Nature-Based Solutions" and without increasing costs to end users.
- As a complementary objective, it is proposed to develop Nature-Based Solutions in all ecosystems to export "Net Zero Emissions Natural Gas". Aligning energy industry investments with mitigation and sequestration thru large scale restoration and improvement of natural and production ecosystems.



Source: Document in preparation by energy experts from the Argentine National Academy of Engineering and the Center of Argentine Engineers. To be published in 2021. Editor: Engineer Ernesto Badaraco.

# Global GHG Emissions by sector




Source: McKinsey&Co. Agriculture and Climate Chage. April 2020

# CO2 cycling in nature

| | Gigatons of CO2 Eq/year | |
|---|---|---|
| | **Emissions** | **Sequestrations** |
| Emissions associated with the Life Cycle of Nature | 771 | |
| Anthropogenic Fossil Emissions | 35 | |
| Emissions Anthropogenic land use | 6 | |
| **TOTAL NATURAL AND ANTHROPOGENIC EMISSIONS** | **811** | |
| | | |
| Natural Absorption by the Oceans. | | -337 |
| Natural absorption by terrestrial ecosystems | | -454 |
| **TOTAL SEQUESTRATION BY NATURE (Soil, Plants, Oceans).** | | **-791** |

| TOTAL LEAKS TO THE ATMOSPHERE EVERY YEAR | 20 |
|---|---|



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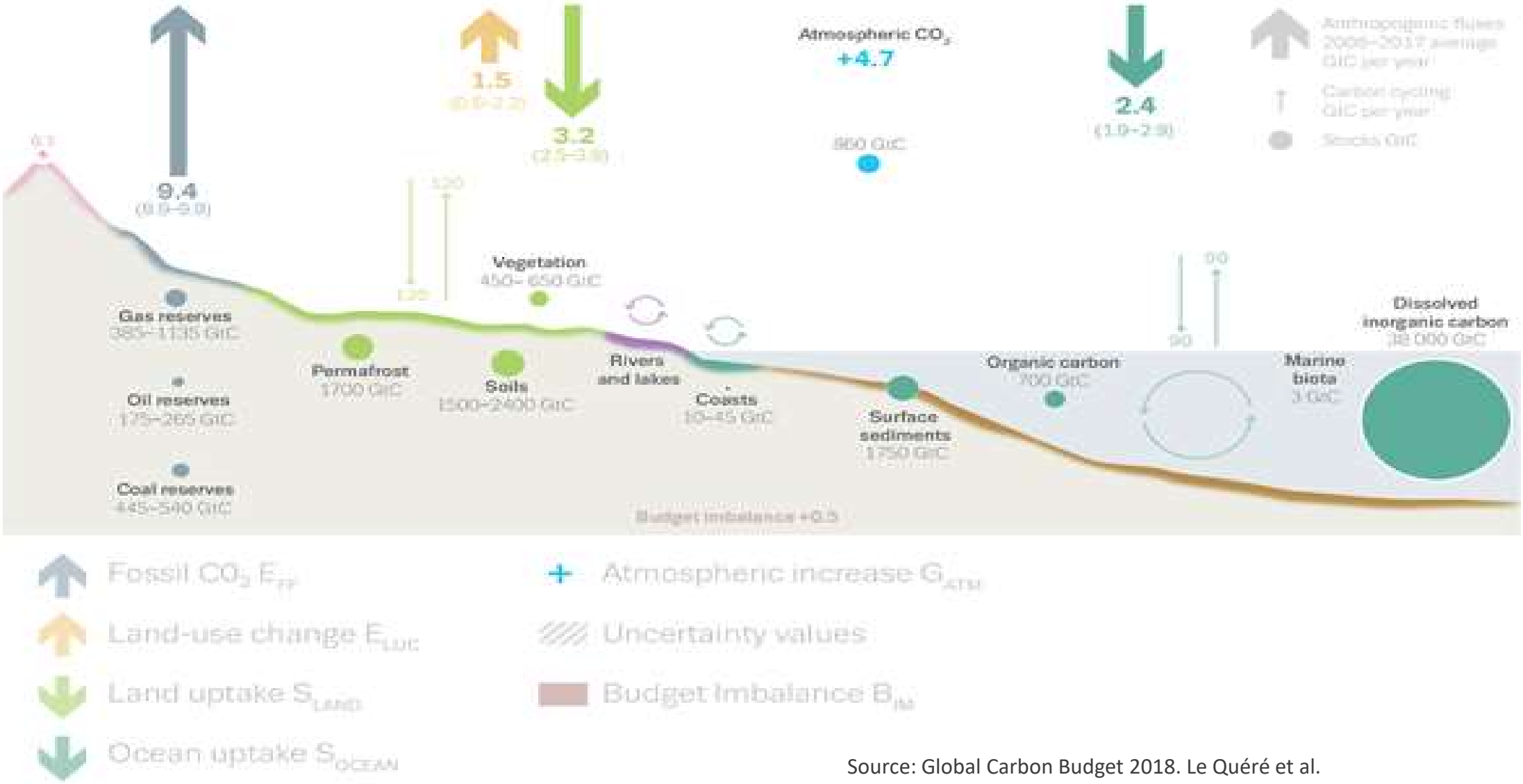
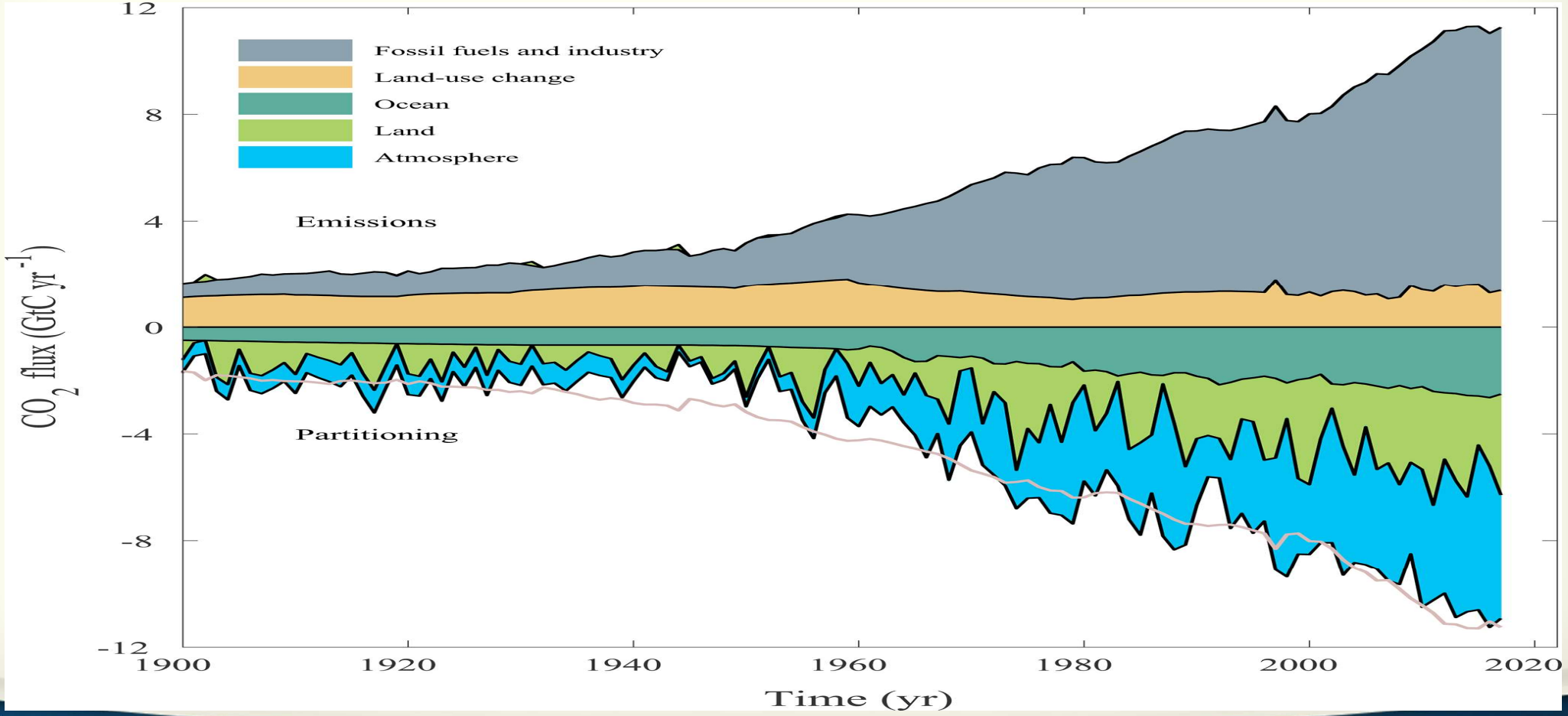
# The global carbon cycle




Source: Global Carbon Budget 2018. Le Quéré et al.

# Global Carbon Balance (Emissions and absoptions in Tons of C)




Sourc: Global Carbon Budget 2018. Le Quéré et al.

# Carbon Stocks & Flows (soil, biomass & air)

GtCO2

3.077

1.648-
2.381

2.491
5.496
8.588

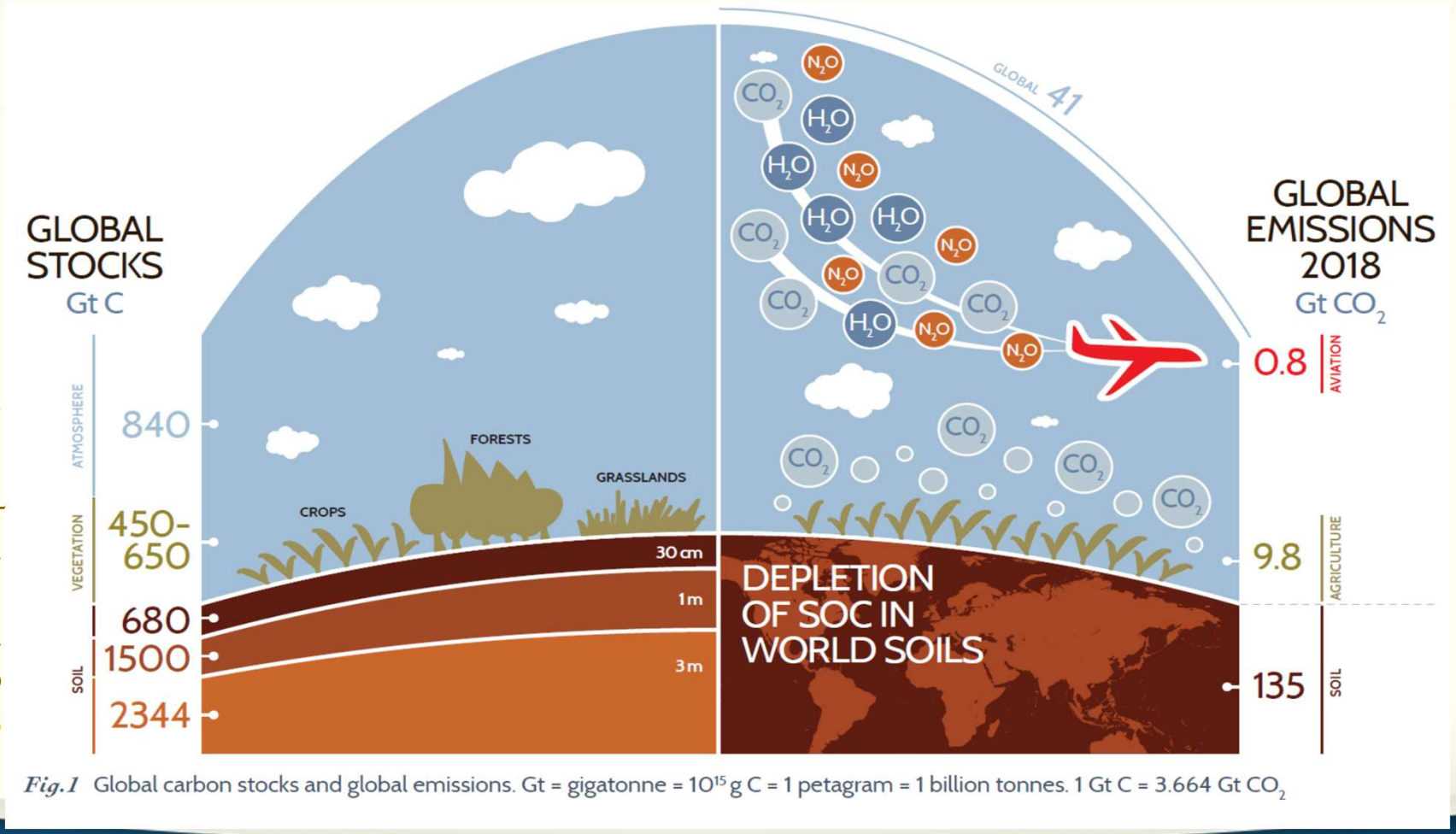
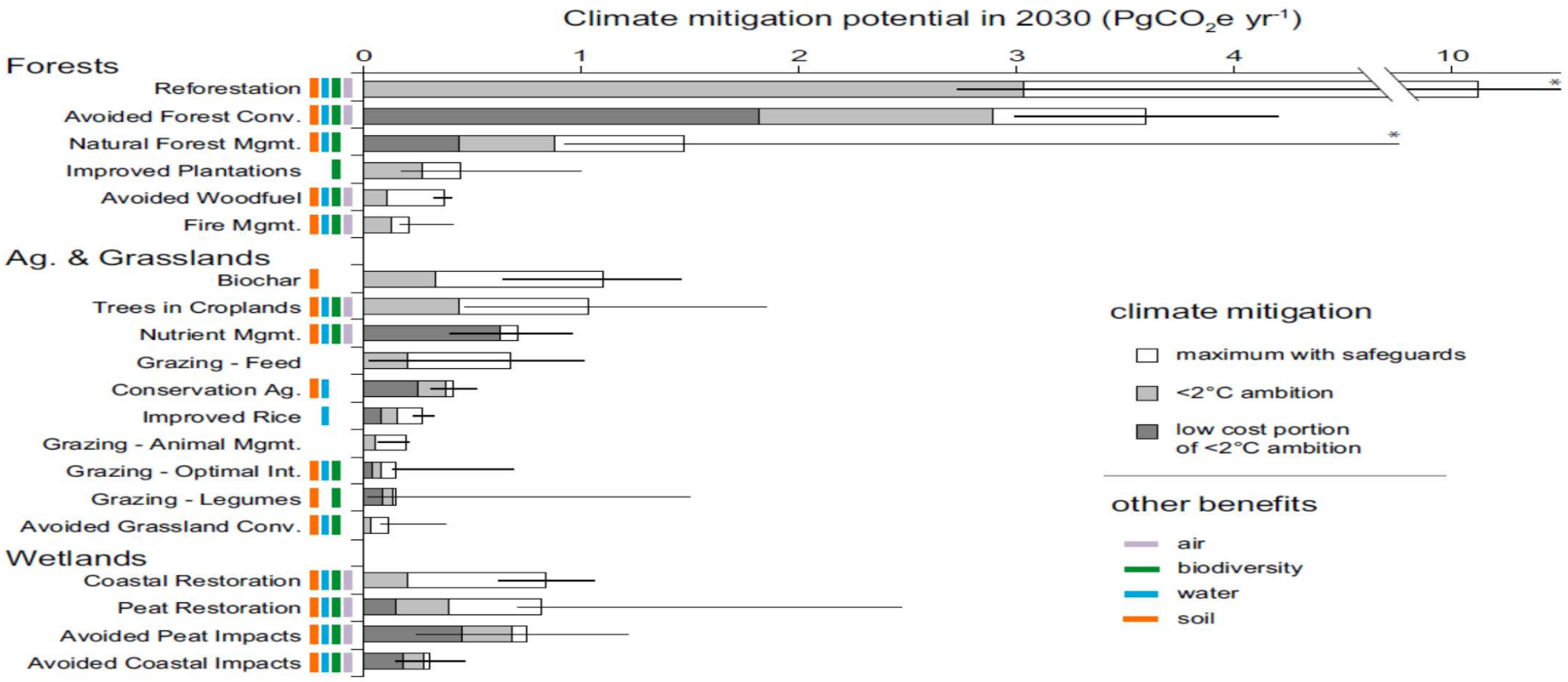



*Fig.1* Global carbon stocks and global emissions. Gt = gigatonne = $10^{15}$ g C = 1 petagram = 1 billion tonnes. 1 Gt C = 3.664 Gt $CO_2$

Source: RECSOIL- Recarbonization of Global Soils- GSP- FAO. 2020

# Total Natural Climate Solutions Mitigation Potential:

## (Sequestration and/or avoided GHG emissions in all ecosystems: 23.8 GtCO2




Fuente: Griscom et al. PNAS | October 31, 2017 | vol. 114 | no. 44 | 11649

# Global Agriculture & food value chains downstream mitigation potential.

**Practices:**

- Improved diets.
- Food waste decrease.
- Renewable energy, overall efficiency, etc.

**TOTAL: 0.76–8.55 GtCO2 Eq/year**

Soource: Adapted from Smith, Pete. Managing the land resource. Royal Society P[illegible]ng. 2017

# Changes in agriculture to mitigate emissions, costs & potential

| Technology | Cost USD/tCO2 Eq | Mitigation Potential MtCO2 eq |
|---|---|---|
| Zero emissions farm machinery and equipment | $ (229.00) | 537 |
| Variable fertilization | $ (176.00) | |
| Reduction of over fertilization with N in China and India | $ (97.00) | 88 |
| Dry direct sowing in rice fields | $ (41.00) | 217 |
| Zero or reduced tillage | $ (41.00) | 119 |
| Improved equipment maintenance | $ (34.00) | |
| Efficiency in the use of fuels | $ (12.00) | |
| Improved irrigation management in rice fields | $ (12.00) | 296 |
| Improved stubble management in rice fields | $ (8.00) | |
| Forage processing for better animal digestibility | $ (3.00) | 219 |
| Low emission focused animal breeding and selection | Zero | 506 |
| Efficient use of nutrients in animal production | Zero | |
| Rotations with N-fixing species | Zero | |
| Improved fertilization in rice | $ 3.00 | 449 |
| N inhibitors in pastures | $ 15.00 | 123 |
| Improved fertilization at the time of application | $ 40.00 | |
| Stabilized and controlled release fertilizers | $ 65.00 | 75 |
| Additives in animal feed | $ 88.00 | 299 |
| Anaerobic digestion of faeces and slurry | $ 92.00 | 260 |
| Technologies to increase efficiency in animal production | $ 119.00 | 180 |
| Optimization of the animal feed | $ 131.00 | 370 |
| Converting mantle irrigation to sprinkler or drip | $ 147.00 | |
| Improved nutrition of specialty crops | $ 523.00 | |

Source: McKinsey&Co. Agriculture and Climate Change. April 2020

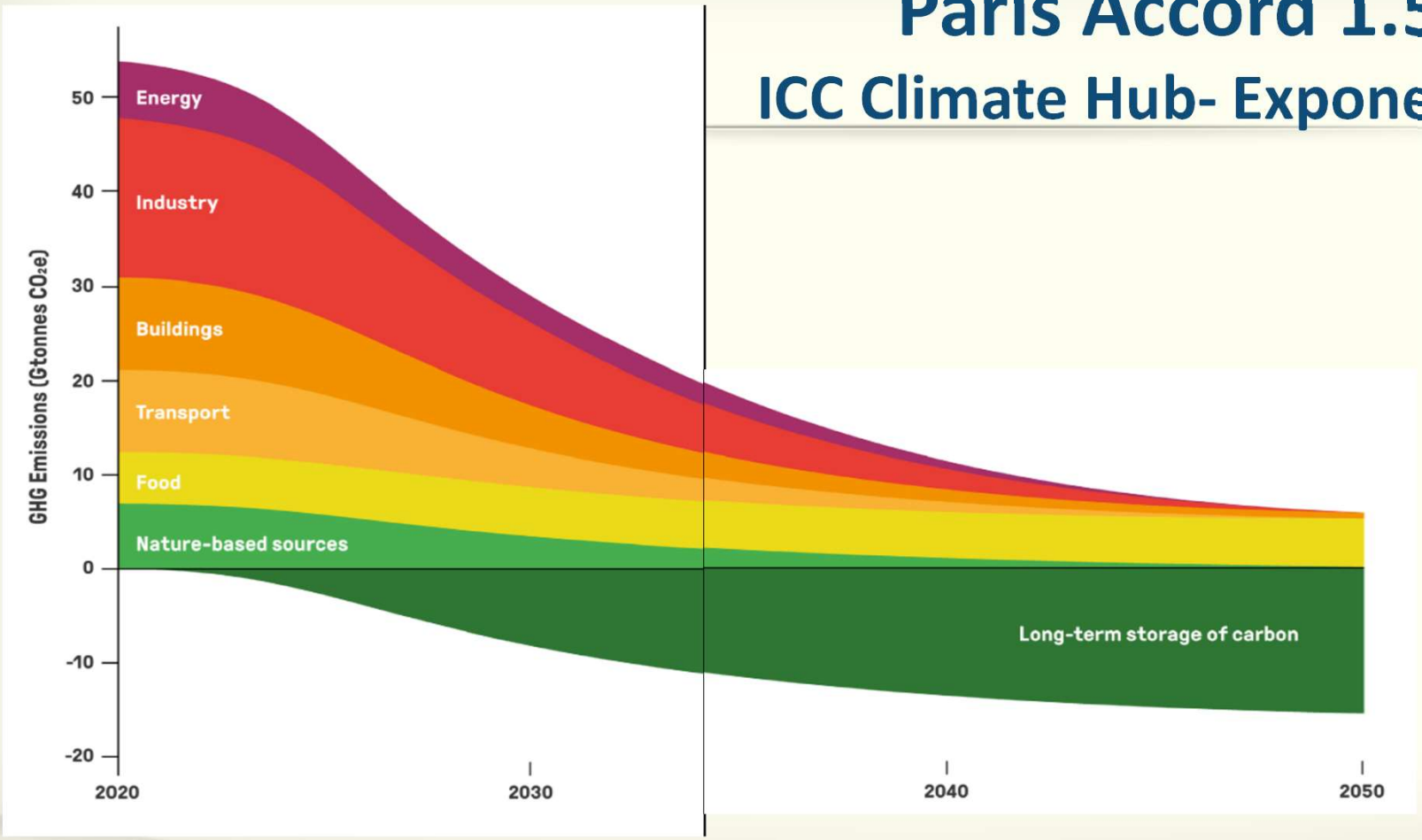
# Argentine National GHG Inventory and the NBS opportunity

| National Inventory of Argentina 2017 | | |
|---|---|---|
| **Sector** | **Mt CO2 Eq** | **%** |
| Animal production | 78.63 | 22% |
| Transport | 50.22 | 14% |
| Power generation | 47.83 | 13% |
| Land use change and forestry | 35.77 | 10% |
| Industrial use of fuels | 33.26 | 9% |
| Residential use of fuels | 27.01 | 7% |
| Agriculture | 21.12 | 6% |
| Industrial processes | 20.05 | 6% |
| Fuel production | 16.79 | 5% |
| Fugitive emissions | 10.52 | 3% |
| MSW | 9.12 | 3% |
| Fuels in other sectores | 7.79 | 2% |
| Residual waters | 6.32 | 2% |
| **Total National Inventory 2017** | **364.43** | **100%** |

| **Avoided emissions and sequestration from Nature Based Solutions in Argentina** |
|---|
| Avoided deforestation, reforestation and conservation |
| Enteric and dung methane emissions |
| Nitrogen fertilizer and other emissions from agriculture |
| Carbon sequestration from afforestation |
| Carbon sequestration in soils |

# Paris Accord 1.5ºC Pathway

## ICC Climate Hub- Exponential Roadmap



# Conclusions

- Argentina needs investments in its energy industry and in its productive and natural ecosystems to reach its development and sustainability targets (SDGs and Paris Accord).
- Zero emissions natural gas is possible with Nature Based Solutions during the energy transition period.
- Additional positive externalities will be promoted:
  - Employment and economic activity increased in all regions
  - Energy security
  - Improved Trade Balance
  - Large scale natural & productive ecosystem restoration
  - Improved agricultural production
  - Increased natural gas and agriculture goods exports
- This engineering, sustainability and economics challenge will be solved if the agriculture and energy industries work together, shoulder to shoulder.

# Thank you for your attention,

# Questions, comments?

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# THANK YOU

Martín Fraguío