WEBINAR

May 31, 2018 - h. 12.30 pm CEST

Ratcheting up Brazil´s Nationally Determined Contribution (NDC): a consistent roadmap towards the global objective of a 1.5 or 2º C world

Roberto Schaeffer - Presenter
Energy Planning Program, COPPE, Universidade Federal do Rio de Janeiro

Enrica De Cian - Moderator
CMCC@Ca'Foscari

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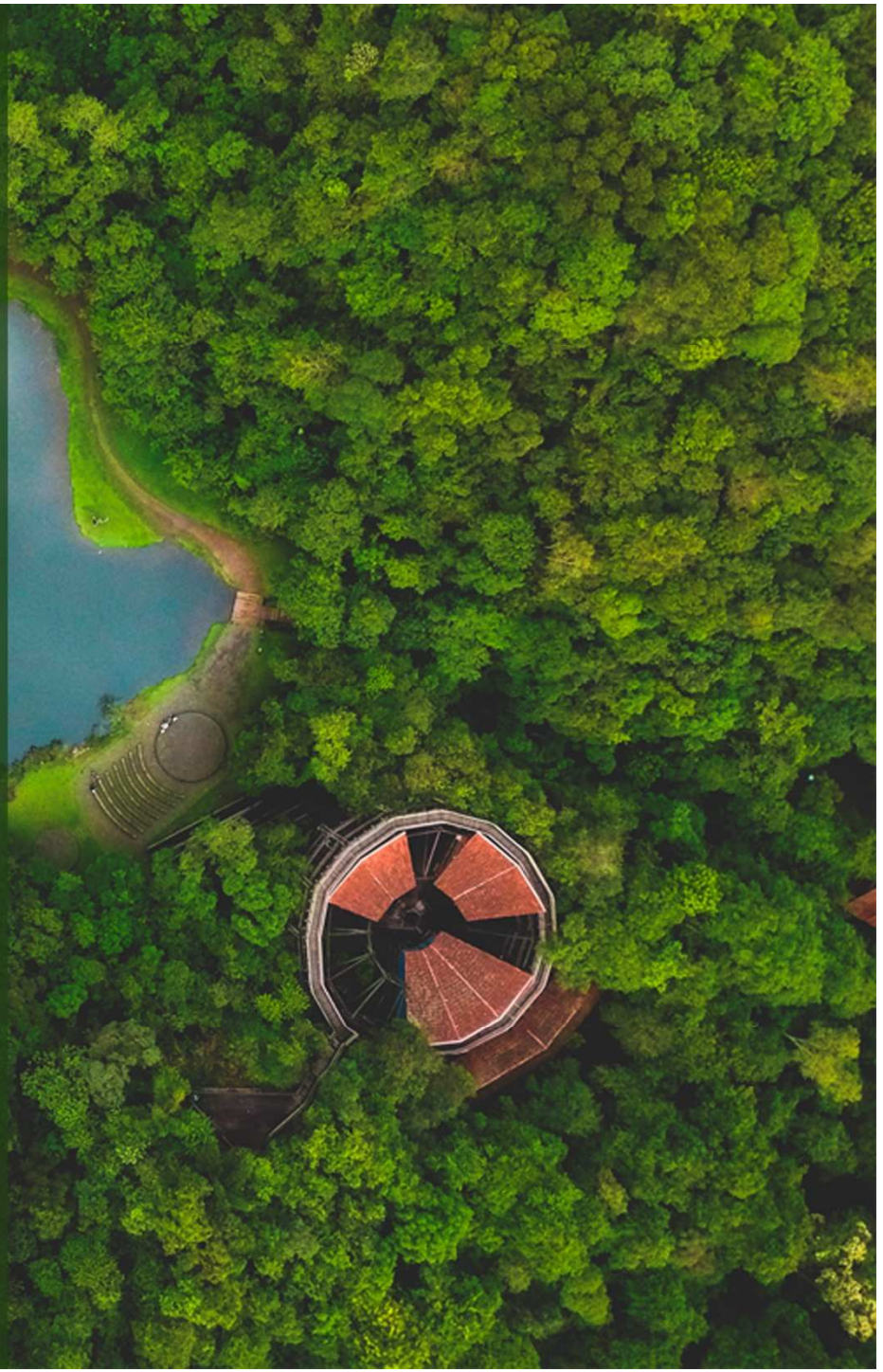

MISSION

To investigate and model our **climate system** and its interactions with **society** to provide reliable, rigorous, and timely **scientific results**, which will in turn stimulate sustainable growth, protect the **environment**, and **develop science driven** adaptation and **mitigation policies** in a **changing climate**

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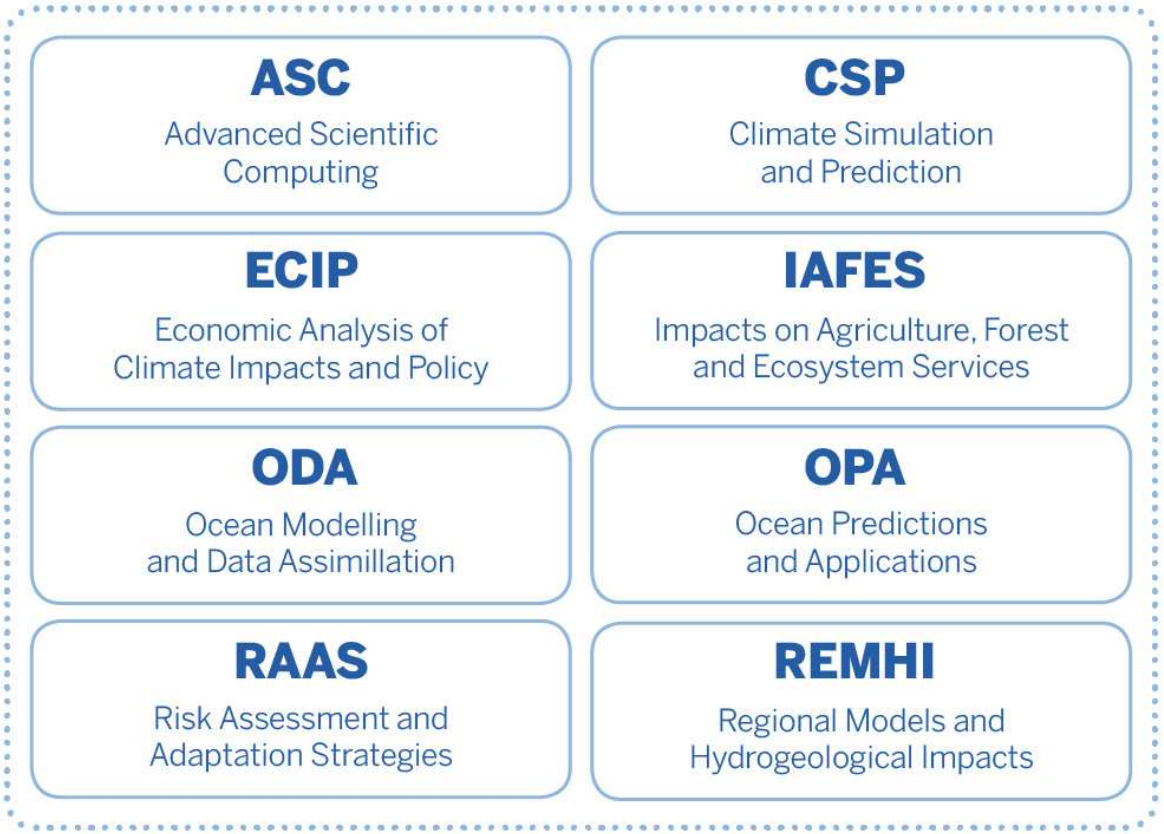
NETWORK



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Ratcheting up Brazil´s nationally determined contribution (NDC)

A consistent national roadmap towards the global objective of a 1.5 - 2°C world

Prof. Roberto Schaeffer, COPPE/UFRJ

with support from Alexandre Szklo, Andre Lucena, Angelo Gurgel, Pedro Rochedo, Alexandre Koberle, Bruno Cunha, Rafael Garaffa and Mariana Imperio

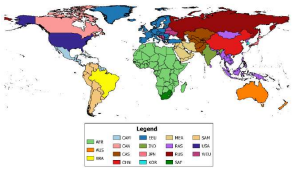
CMCC, Venice, 31 May 2018

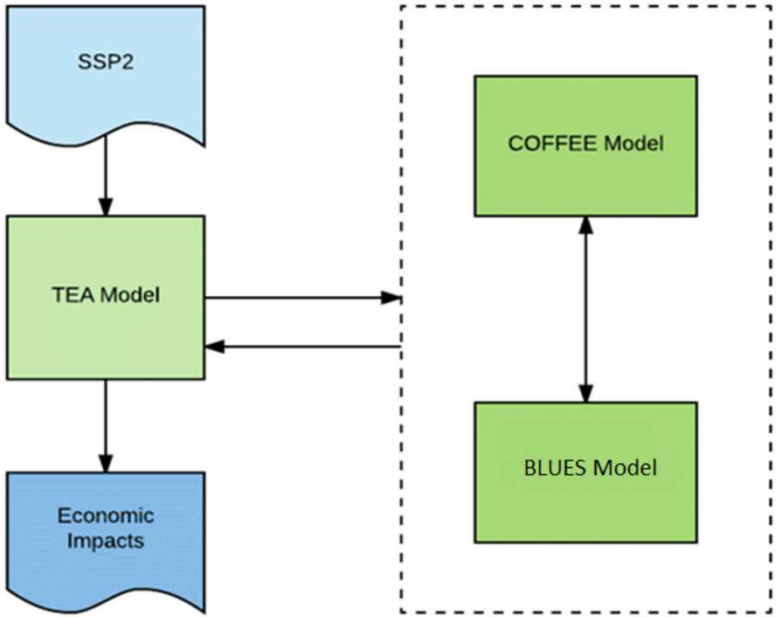
This project has received funding from the **European Union's Horizon 2020 research and innovation programme** under grant agreement No 642147 (CD-LINKS).

Model Linkages

Total-**E**conomy **A**ssessment (**TEA**) – CGE Model

Economy-Energy–Land Use
GTAPinGAMS
Recursive dynamic
18 regions



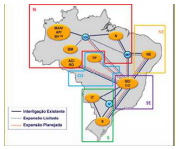


COmputable **F**ramework For **E**nergy and the **E**nvironment (**COFFEE**)

- Optimization model – Energy and Land Use
- 18 regions
- Translation into GAMS

Brazil **L**and-**U**se and **E**nergy **S**ystems Model **(BLUES)**

- Optimization model – Energy and Land Use
- 6 Brazilian regions
- Translation into GAMS



COPPE UFRJ Programa de Planejamento Energético

COmputable Framework For Energy and the Environment

The COFFEE Model

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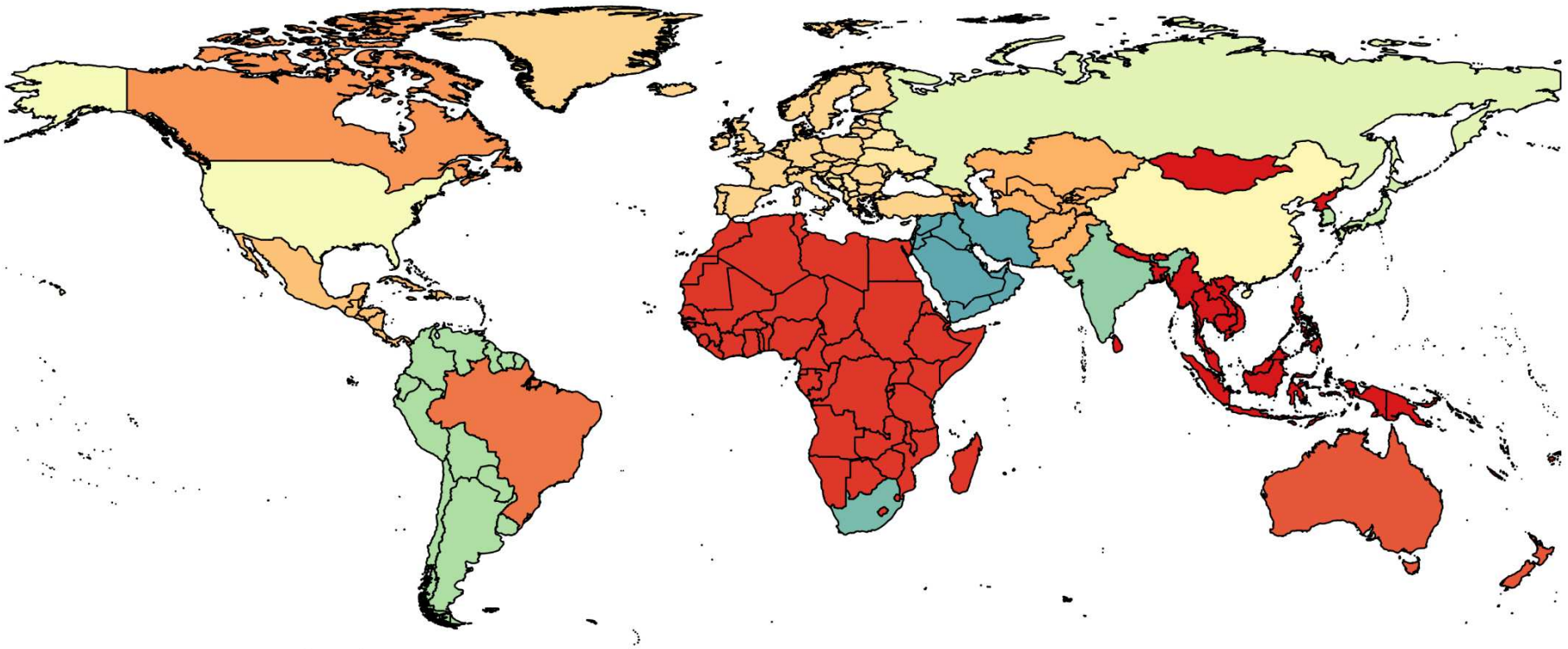
The COFFEE Model



The COFFEE Model: Scenario Protocol

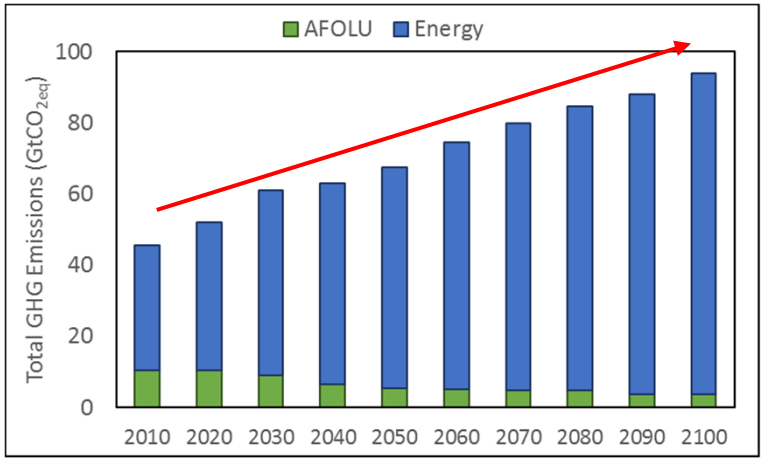
- **Global Current Policies (GCP or NPi)**: based on current and indicated policies for all regions (energy, land and climate)

- **Global 2°C (G2D or NPi1000)**: GCP + global budget of 1,000 $GtCO_2$

- **Global 1.5°C (G1.5D or NPi400)**: GCP + global budget of 400 $GtCO_2$

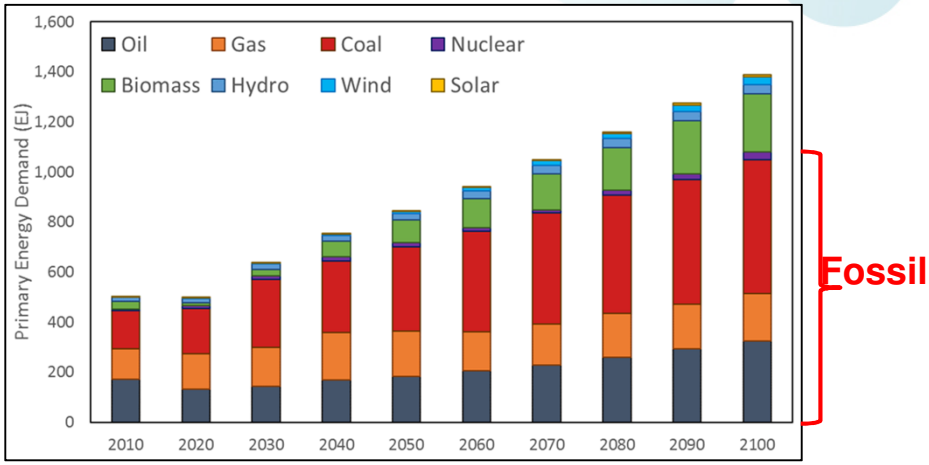
COFFEE: Current Policies (GCP or NPi)

GHG Emissions ($GtCO_{2eq}$)

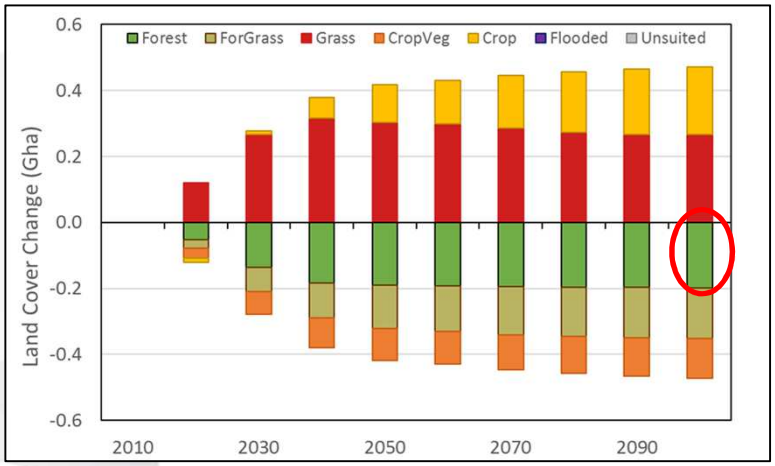


Cumulative Emissions: 5,500 $GtCO_2$

Primary Energy (EJ)

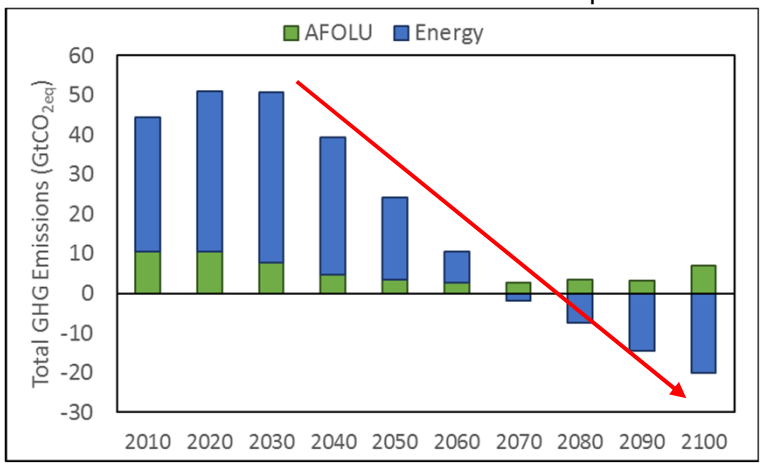


Land Use Change (Gha)



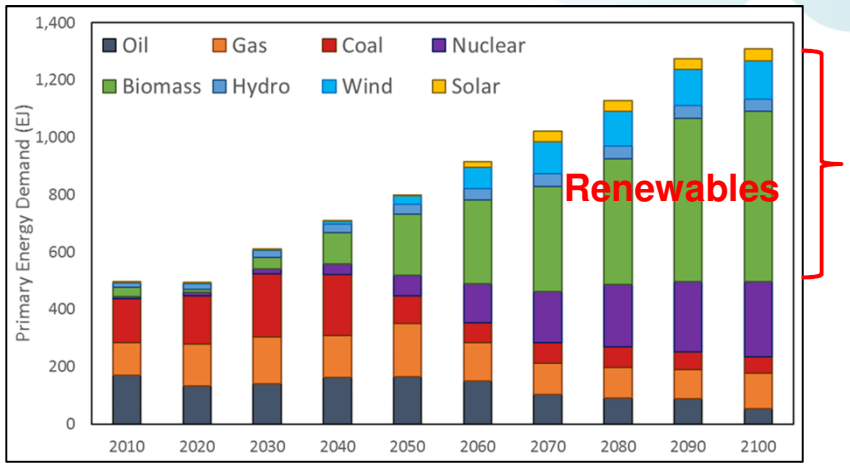
COFFEE: 2°C Scenario (G2D or NPi1000)

GHG Emissions ($GtCO_{2eq}$)

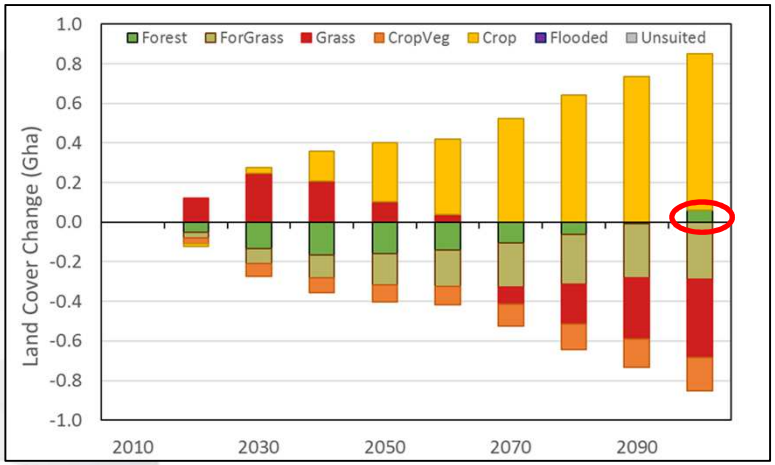


Cumulative Emissions: 5,500 $GtCO_2$

Primary Energy (EJ)

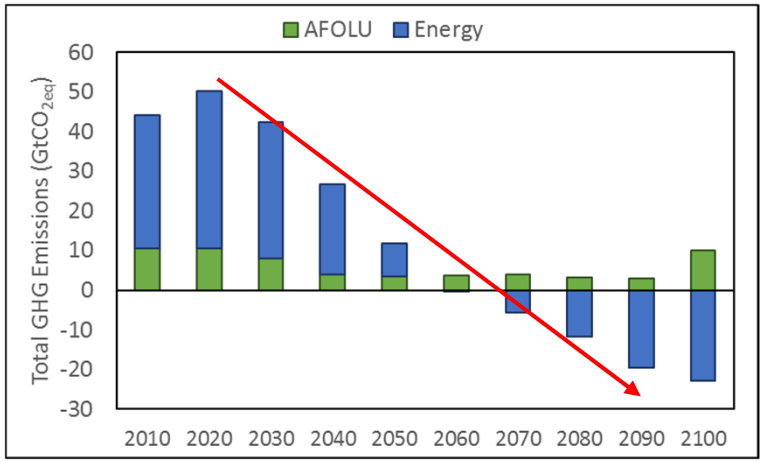


Land Use Change (Gha)



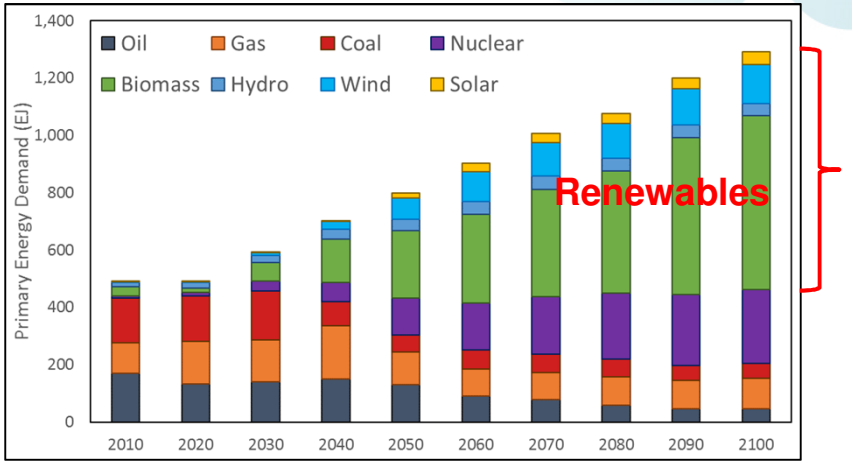
COFFEE: 1.5°C Scenario (G1.5D or NPi400)

GHG Emissions ($GtCO_{2eq}$)

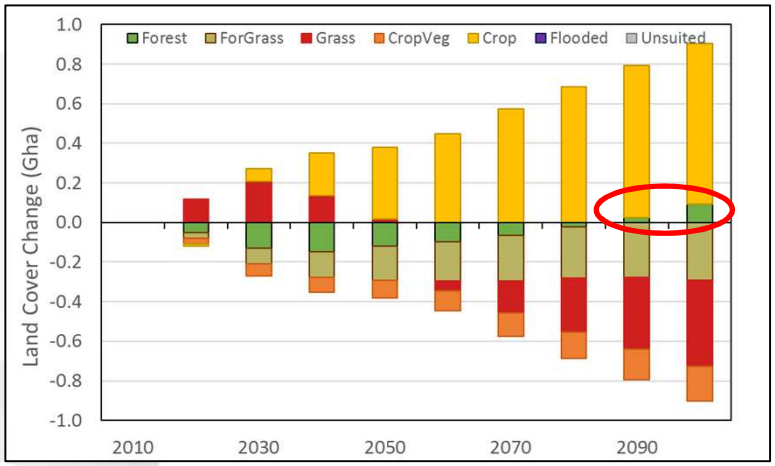


Cumulative Emissions: 5,500 $GtCO_2$

Primary Energy (EJ)

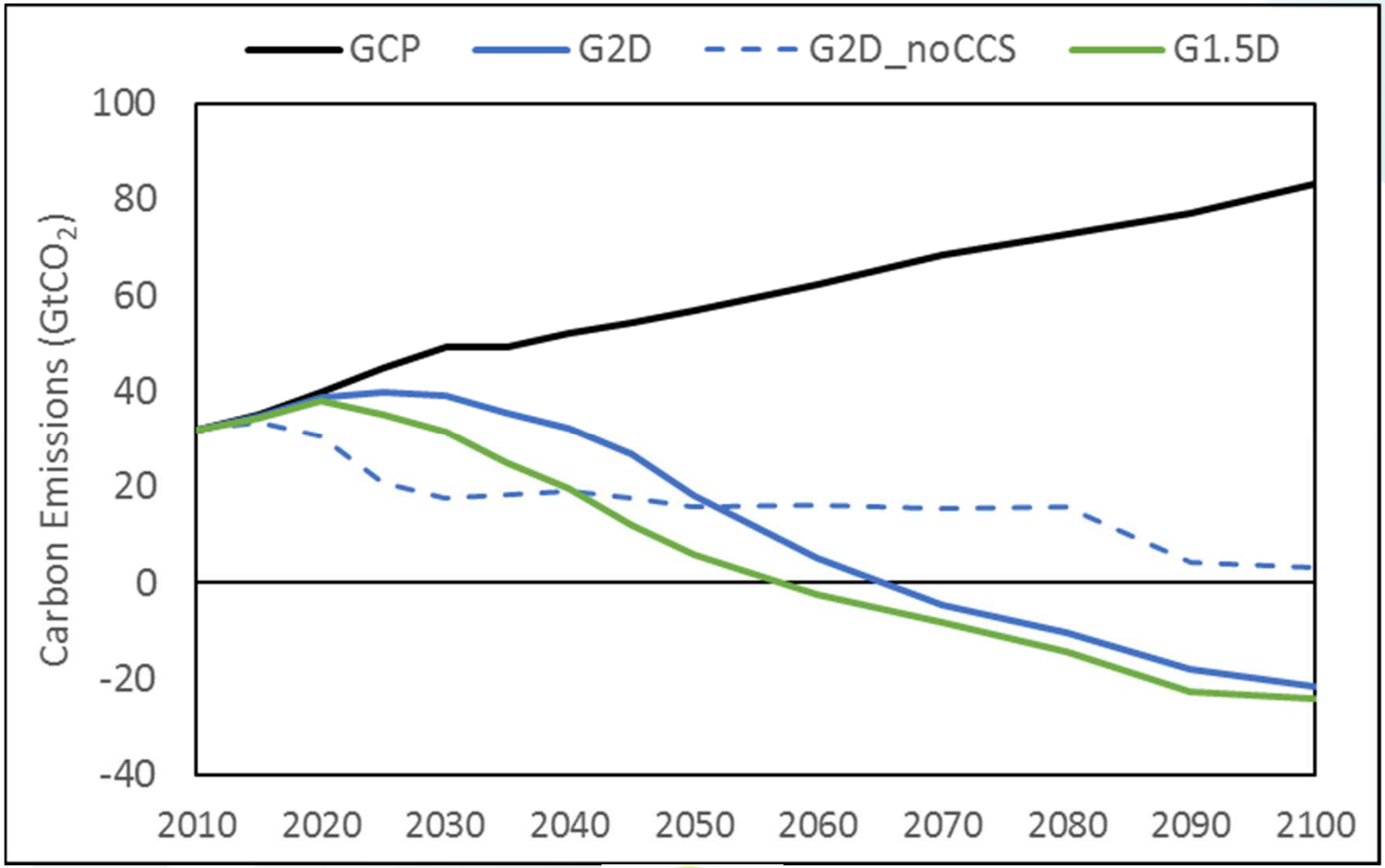


Land Use Change (Gha)



COFFEE: Scenario Comparison

Global CO2 Emissions



COFFEE: National Budgets for Brazil

COFFEE's CO_2 budgets for Brazil for the 2010-2050 period:
(to be used in the BLUES Model)

- **Global 2°C (G2D or NPi1000)**: 23.6 $GtCO_2$ (out of 1,000 $GtCO_2$)
  - Literature average: 23.8 $GtCO_2$

- **Global 1.5°C (G1.5D or NPi400)**: 17.0 $GtCO_2$ (out of 400 $GtCO_2$)

Period	Budget $GtCO_2$	Probability < 2°C	How was budget determined?	Reference
2010-2050	21.0	67%	Allocation (per-capita)	Messner et al, 2010
2014-2050	18.0	RCP2.6	Allocation (C&C)	Gignac and Matthews, 2015
2010-2050	16.0	67%	PRIMAP model (min)	Rocha et al, 2015
2010-2050	41.0	67%	PRIMAP model (max)	
2010-2050	19.8	n/a	Allocation TISS-DSF ScenA	Lucon et al, 2015
2010-2050	21.1	n/a	Allocation TISS-DSF ScenA	
2010-2050	29.6	n/a	Allocation TISS-DSF ScenA	
2010-2050	41.4	n/a	Allocation TISS-DSF ScenA	
2010-2050	22.0	n/a	Allocation WWF-Ecofys CDC	
2010-2050	25.0	n/a	Allocation WWF-Ecofys GDR	
2010-2050	26.0	n/a	Allocation WWF-Ecofys C&C	
2010-2050	23.0	n/a	Allocation IEA (WEO2013)	
2010-2050	41.3	67%	Allocation (population)	Kanitkar et al, 2013
2010-2050	4.7	67%	AIM/CGE - INDC2030i 1000	CDLINKS, 2017
2010-2050	0.5	67%	AIM/CGE - NPi2020 1000	
2010-2050	16.0	67%	COPPE-COFFEE 1.0 - INDC2030i 1000	
2010-2050	23.6	67%	COPPE-COFFEE 1.0 - NPi2020 1000	
2010-2050	7.5	67%	DNE21+ V.14 - INDC2030i 1000	
2010-2050	13.1	67%	DNE21+ V.14 - NPi2020 1000	
2010-2050	37.9	67%	IMAGE 3.0 - INDC2030i 1000	
2010-2050	37.5	67%	IMAGE 3.0 - INDC2030ip 1000	
2010-2050	37.6	67%	IMAGE 3.0 - NPi2020 1000	
2010-2050	**23.8**	-	**Average value from literature**	

Brazil`s Land-Use and Energy Systems

The BLUES Model

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The BLUES Model: Scenario Protocol

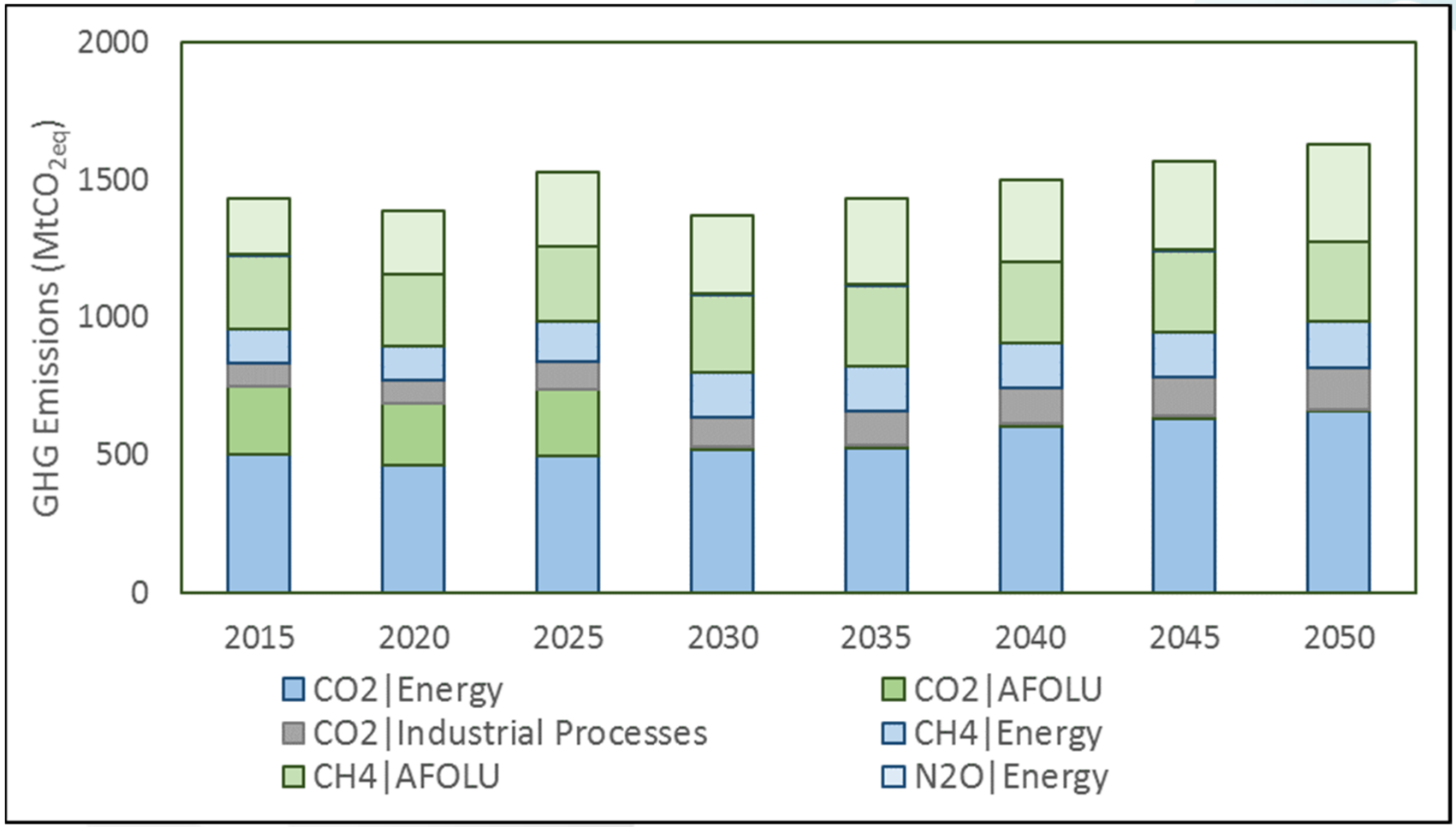
- **National Current Policies (NCP or NPi)**: based on current and indicated policies for Brazil (energy, land and climate)

- **National 2°C (N2D or NPi1000)**: NCP + national share of 2°C budget up to 2050 (23.6 $GtCO_2$)

- **National 1.5°C (N1.5D or NPi400)**: NCP + national share of 1.5°C budget up to 2050 (17.0 $GtCO_2$)

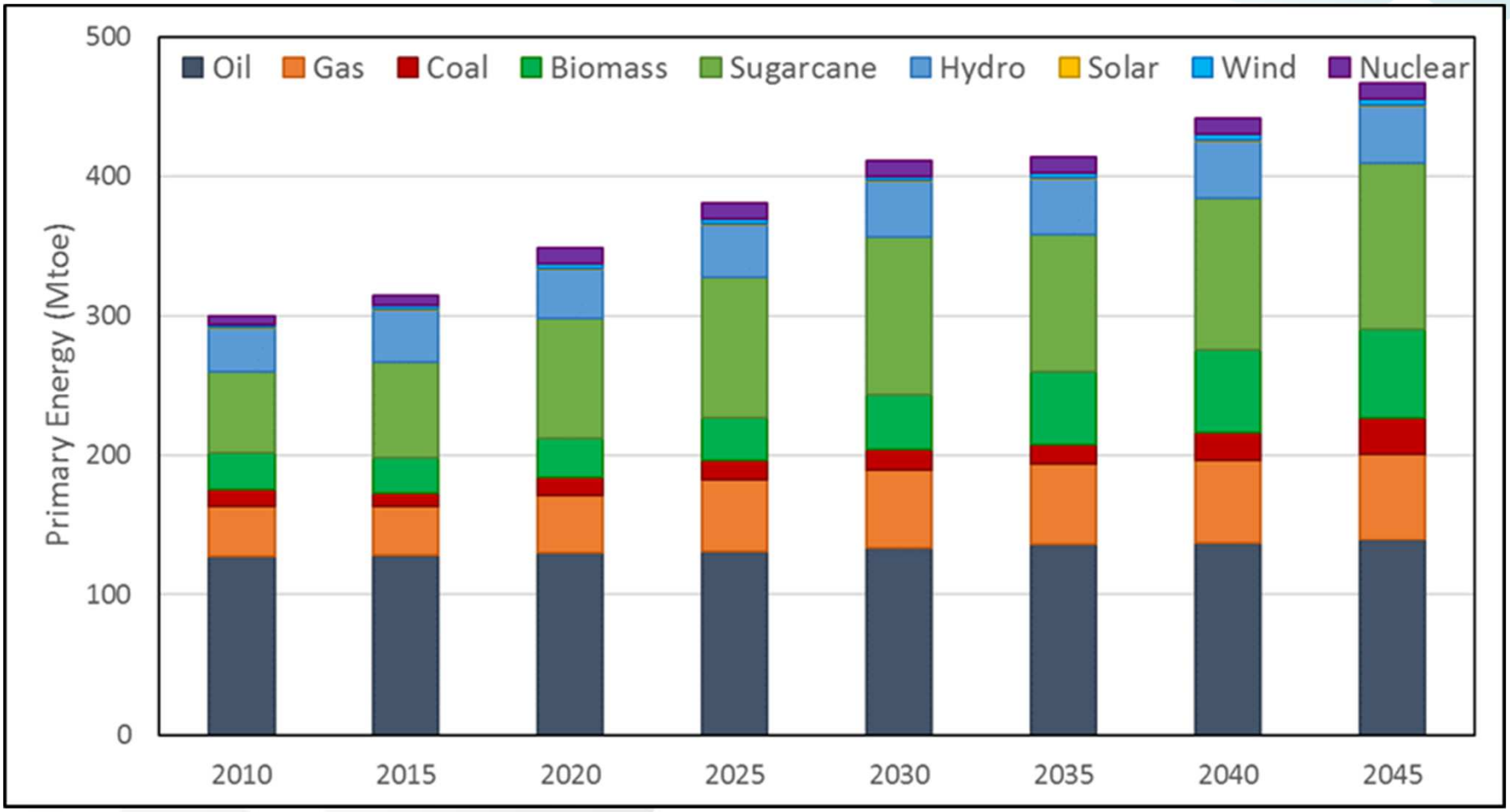
BLUES: Current Policies (NCP or NPi)

GHG Emissions



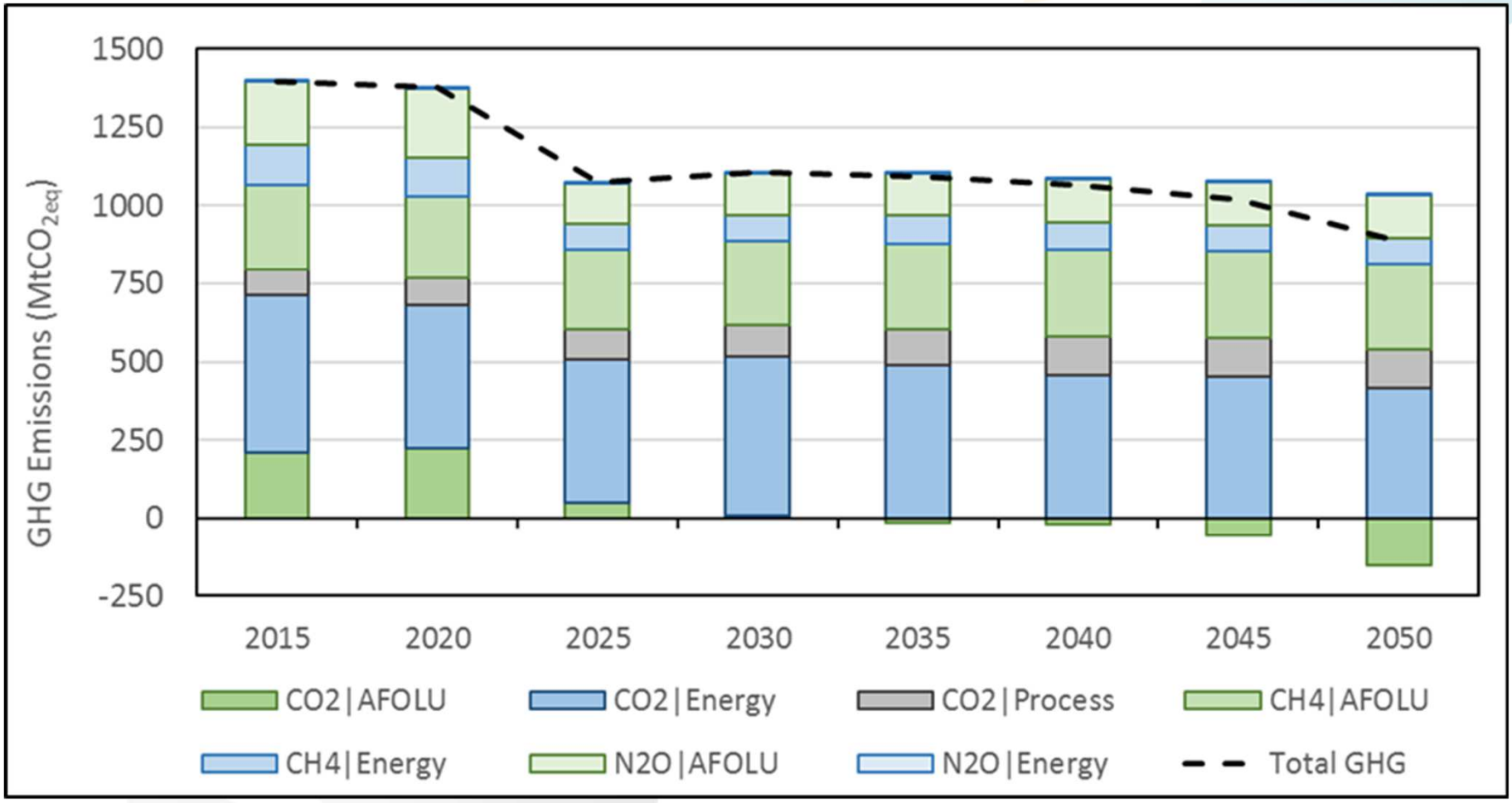
BLUES: Current Policies (NCP or NPi)

Primary Energy Consumption



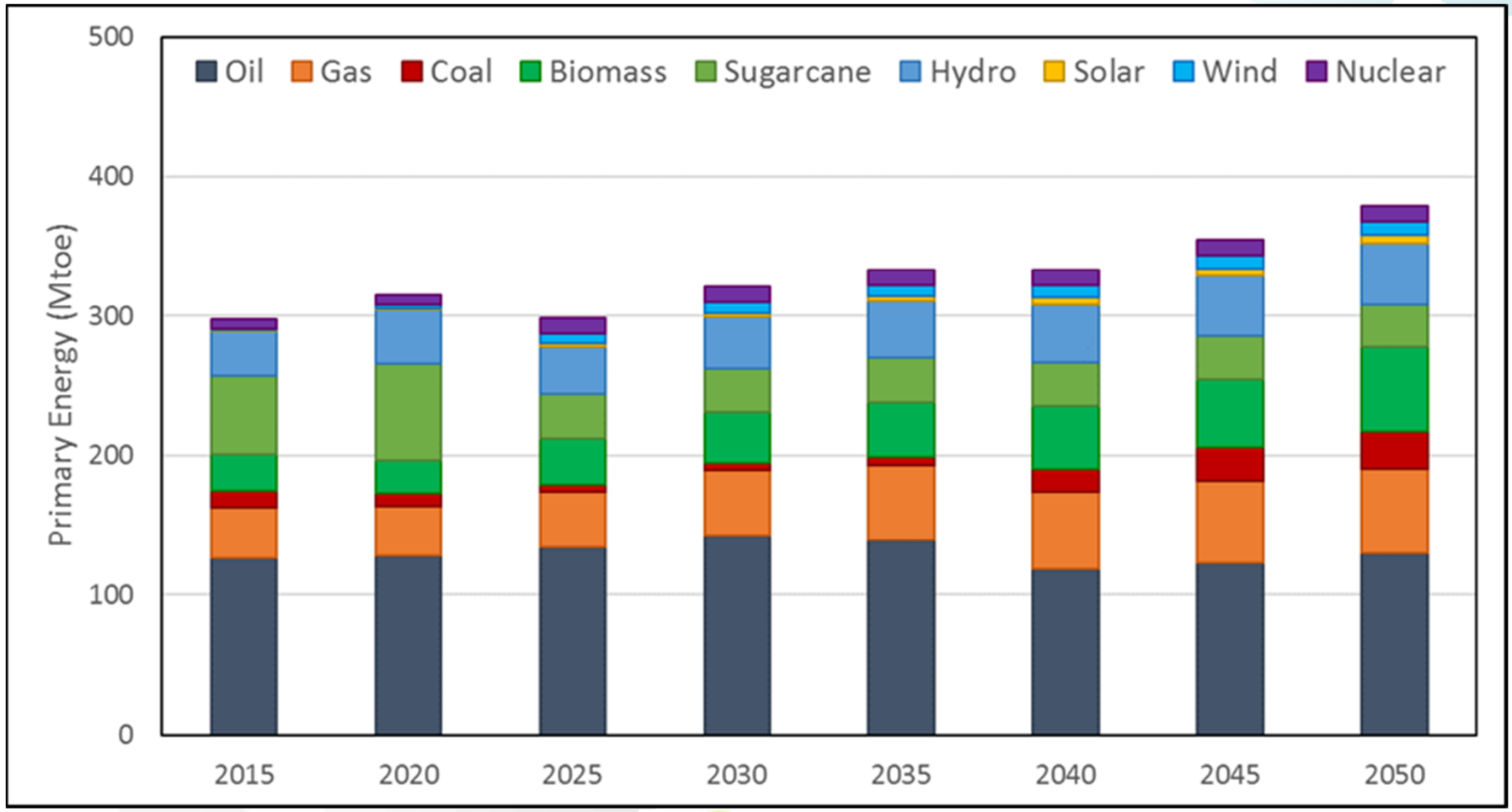
BLUES: 2°C Scenario (N2D or NPi1000)

GHG Emissions



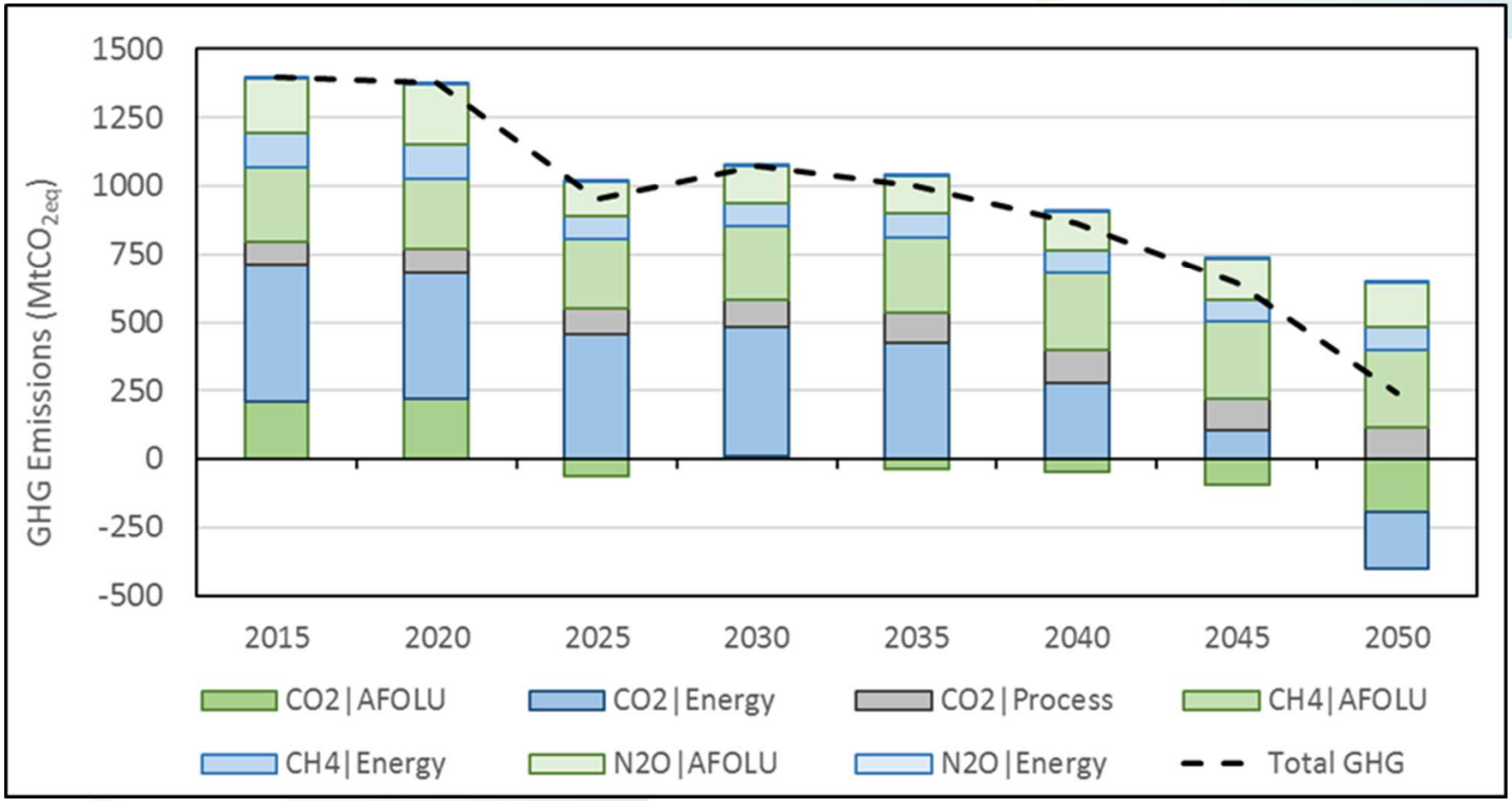
BLUES: 2°C Scenario (N2D or NPi1000)

Primary Energy Consumption



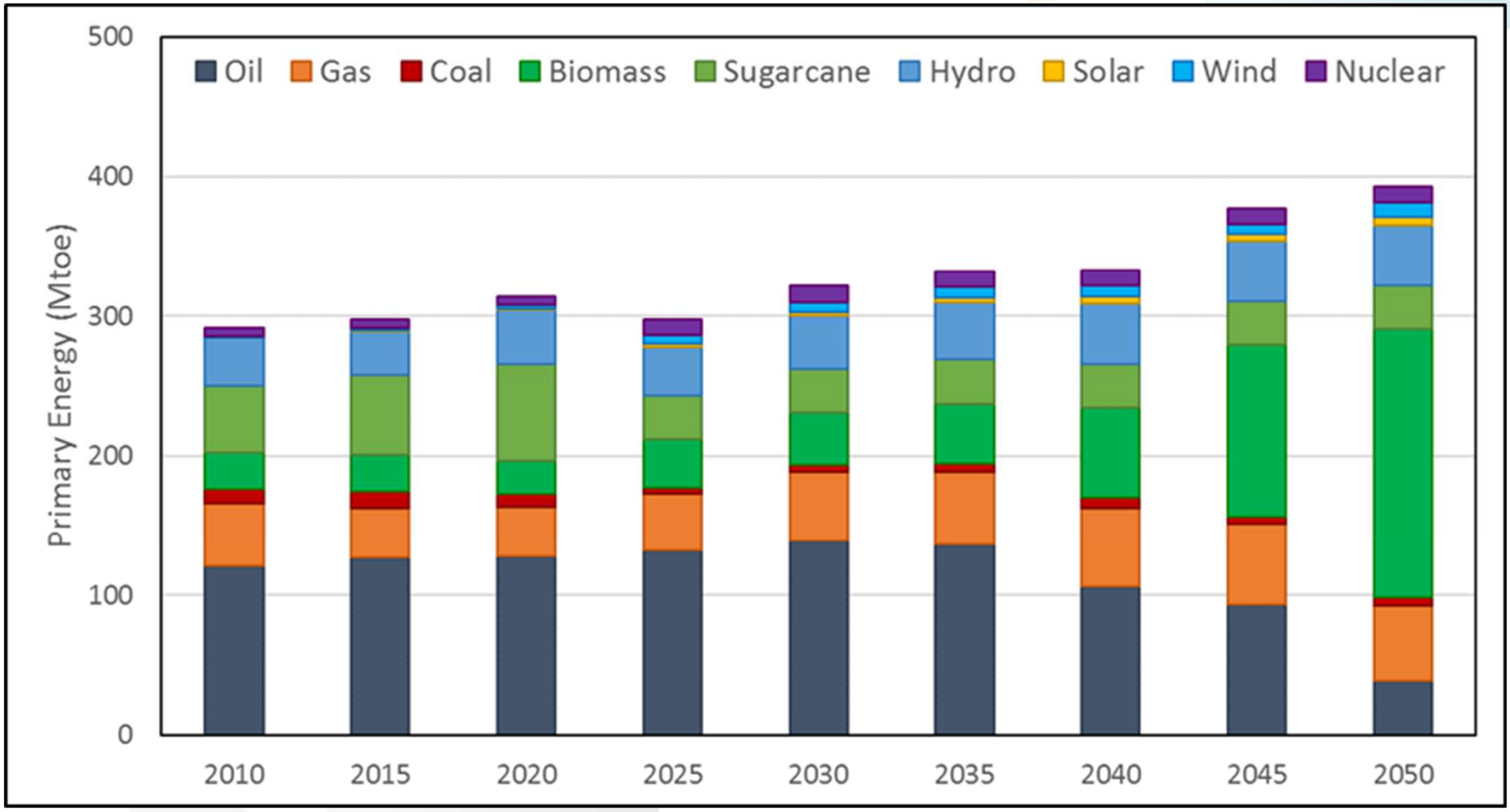
BLUES: 1.5°C Scenario (N1.5D or NPi400)

GHG Emissions



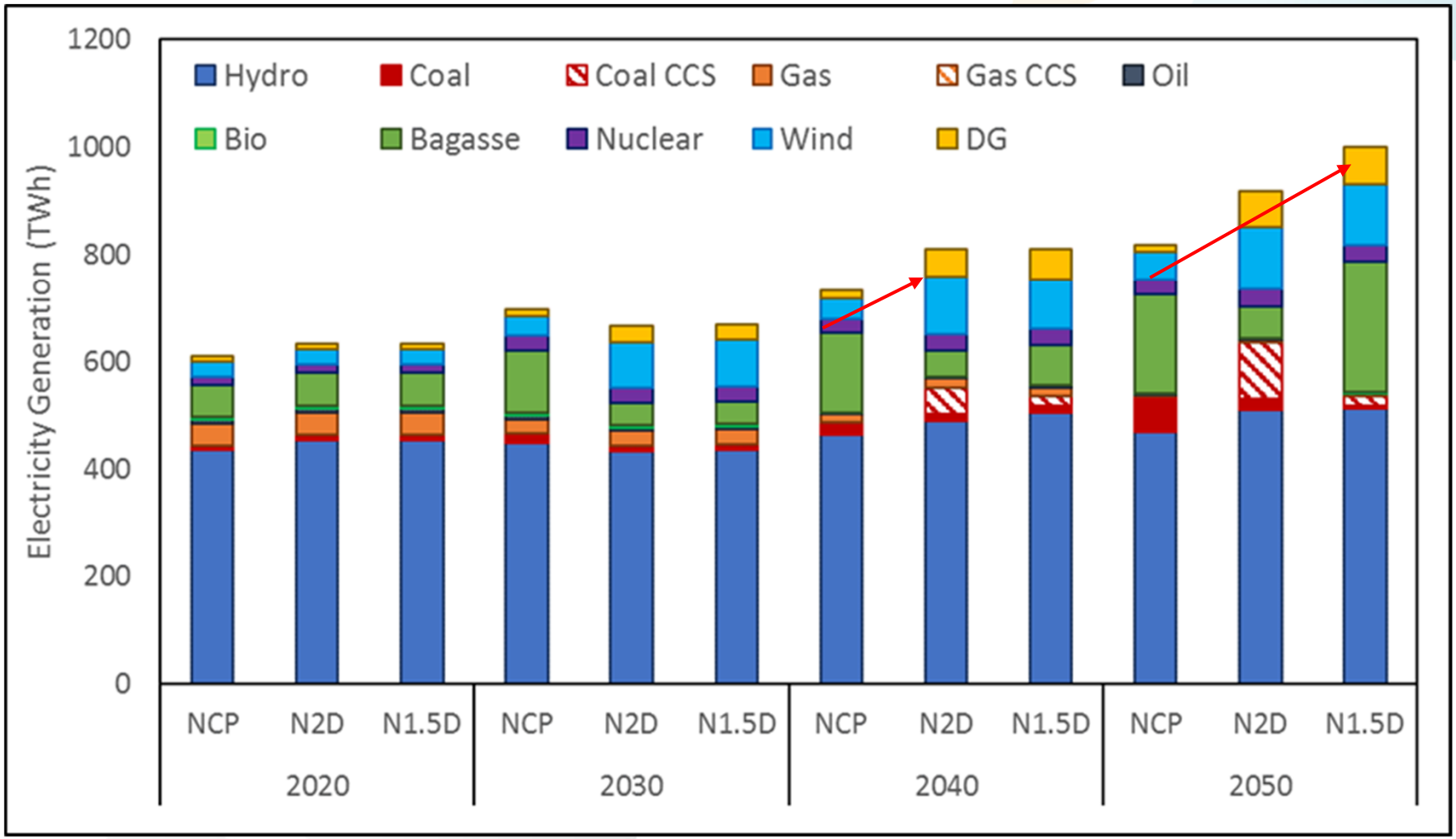
BLUES: 1.5°C Scenario (N1.5D or NPi400)

Primary Energy Consumption



BLUES: Scenario Comparison

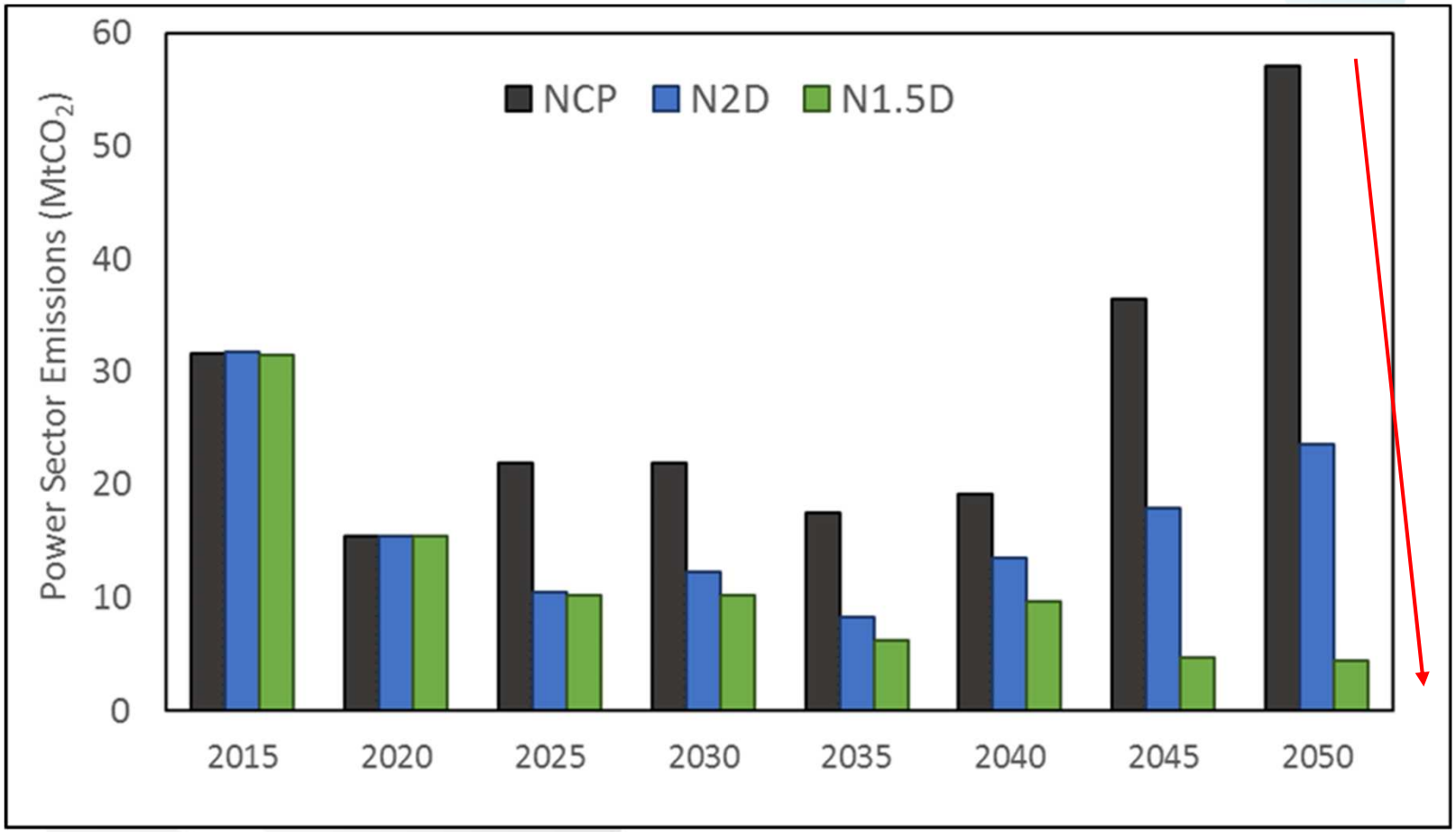
Electricity Generation (TWh)



BLUES: Scenario Comparison

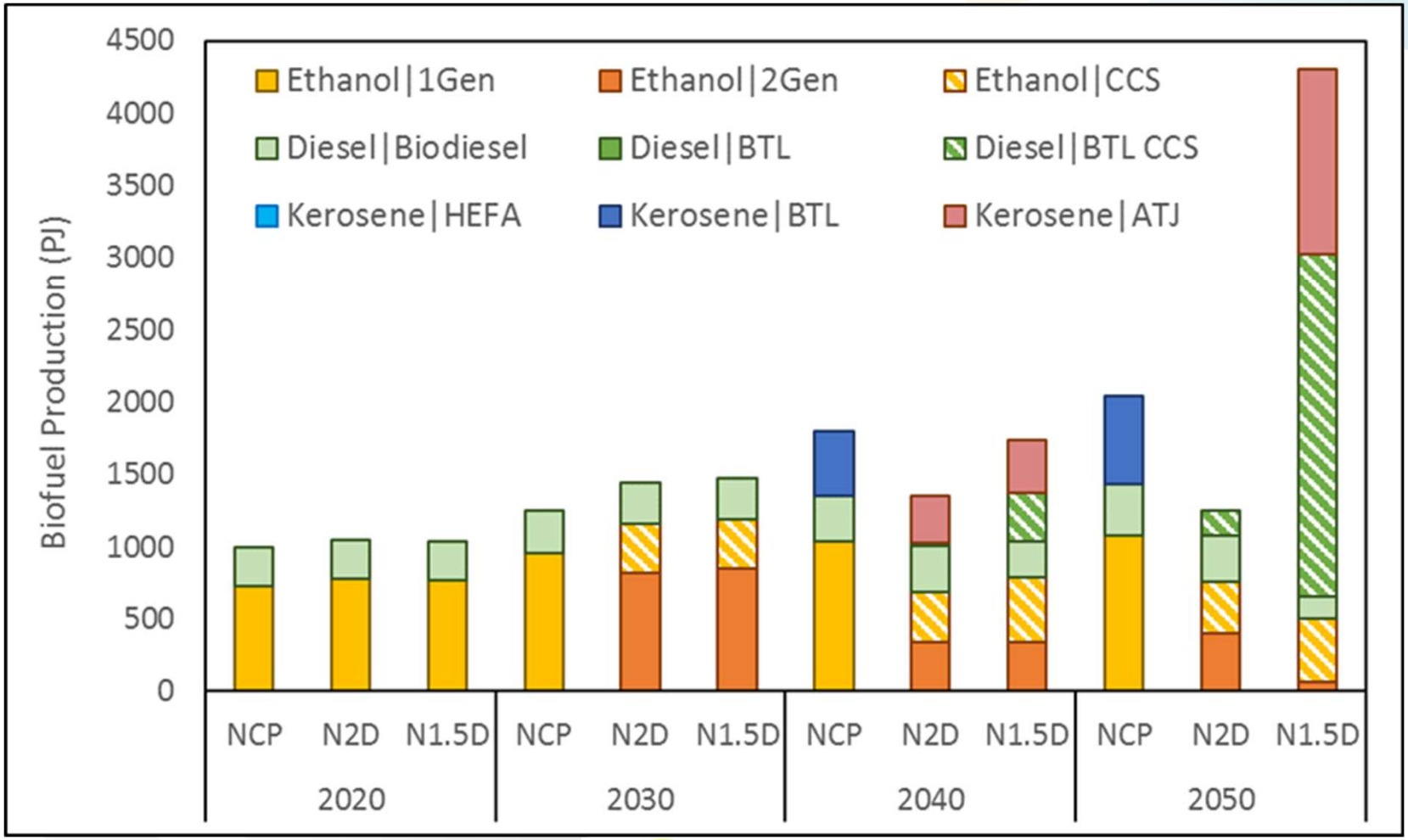
Power Sector Emissions ($MtCO_2$)

Note: Industrial and refinery CHP excluded



BLUES: Scenario Comparison

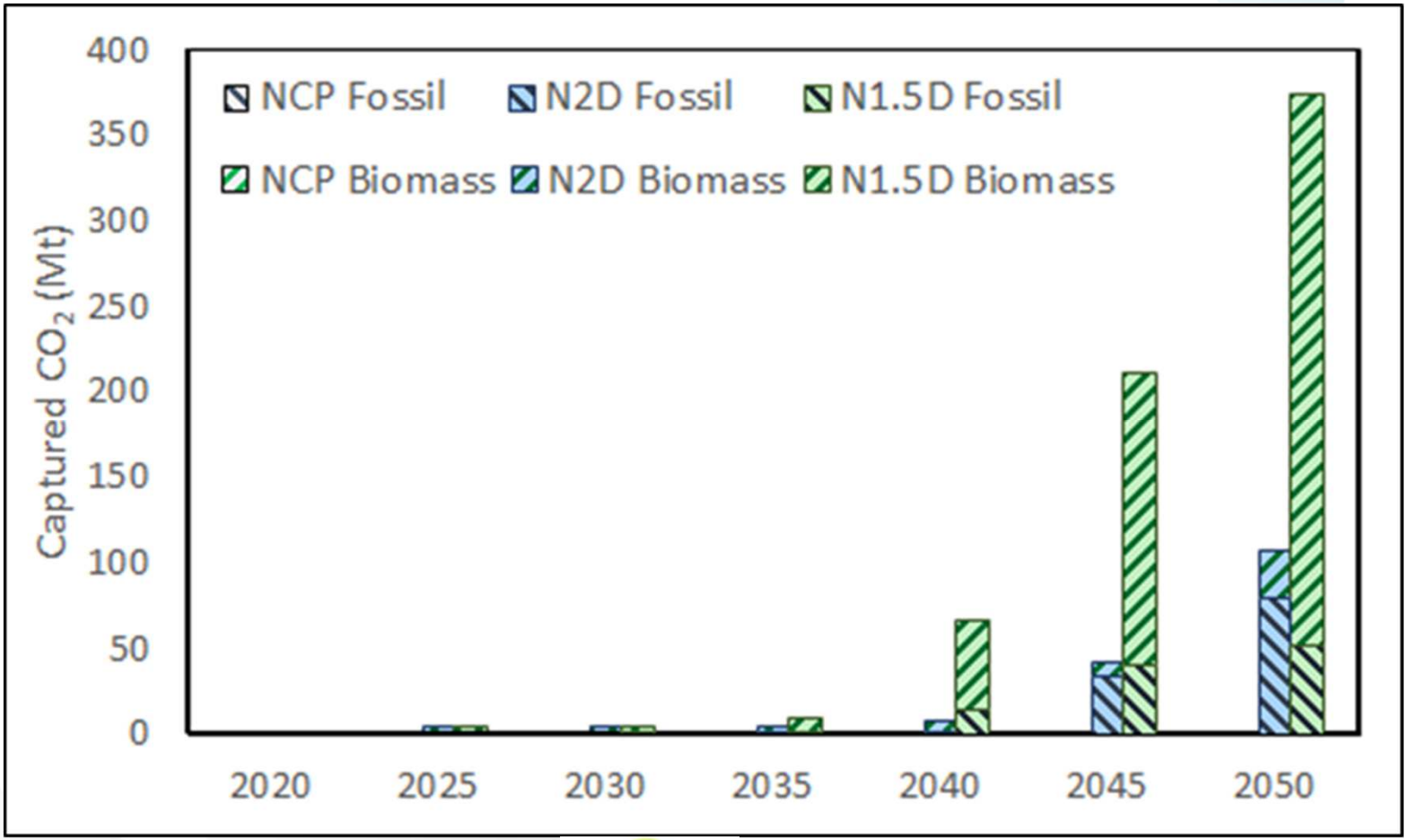
Liquid Biofuels Production (PJ)



BLUES: Scenario Comparison

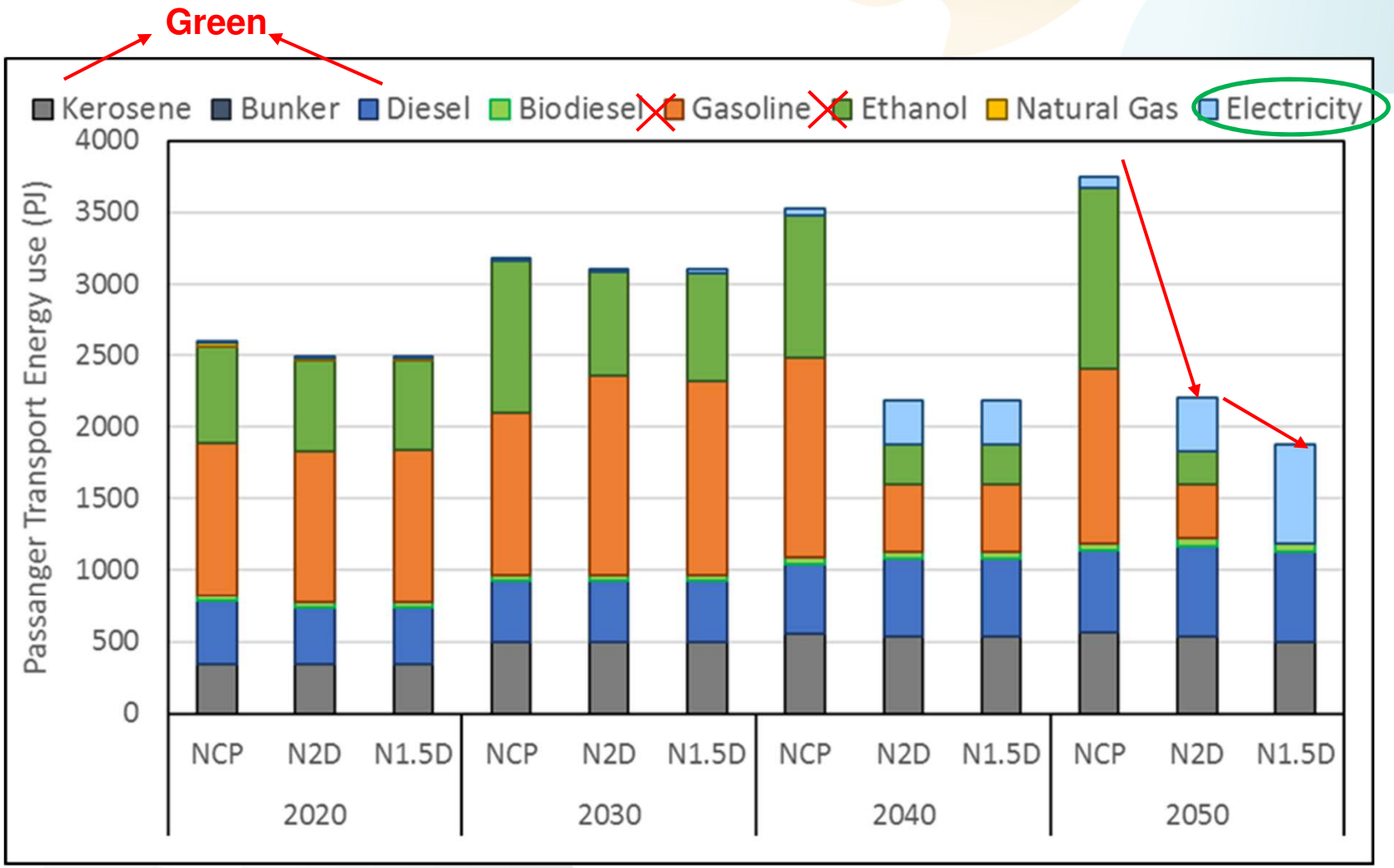
Carbon Capture and Storage (Mt)

Fossil and Biomass



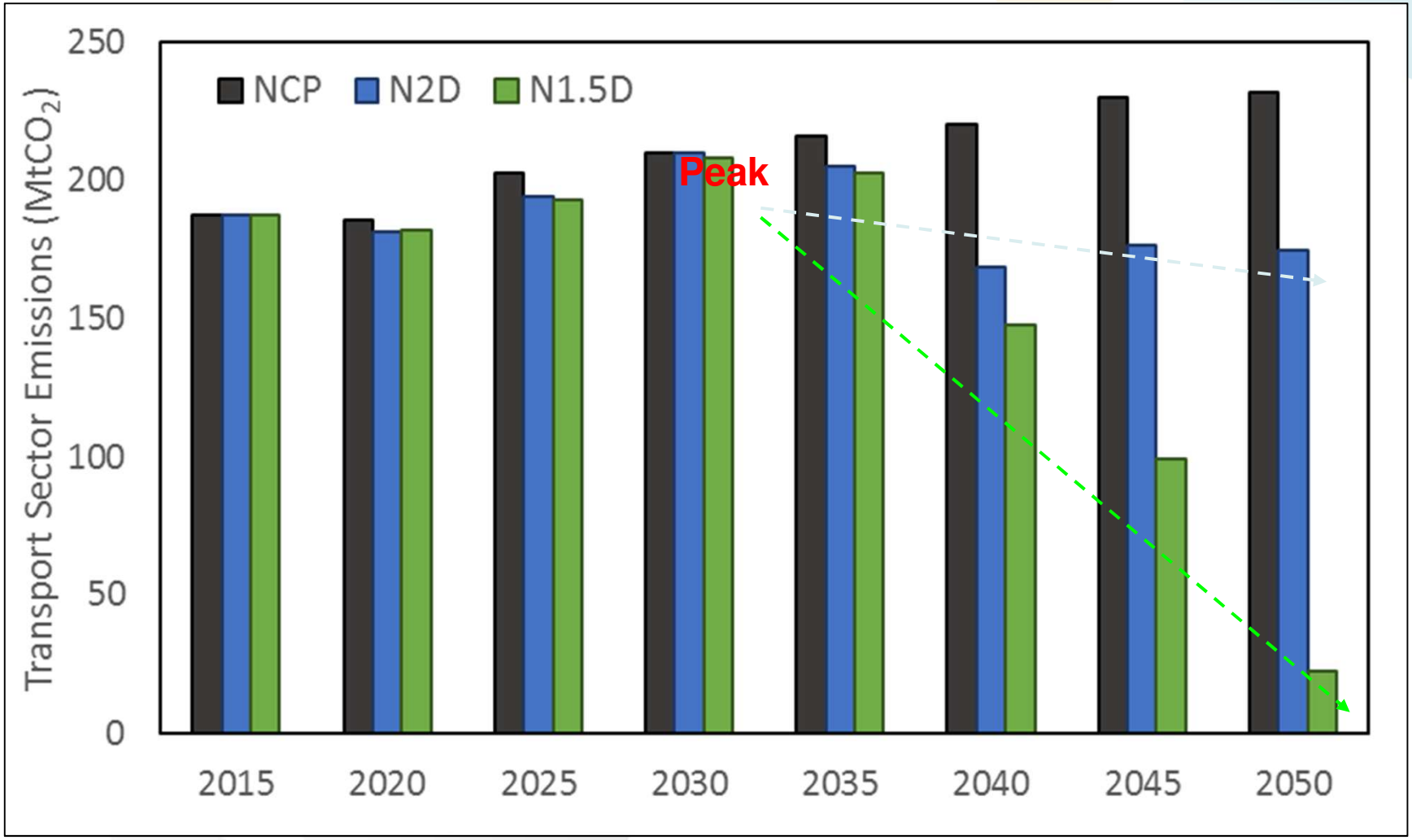
BLUES: Scenario Comparison

Transport Sector – Passenger Energy Use



BLUES: Scenario Comparison

Transport Sector – GHG Emissions



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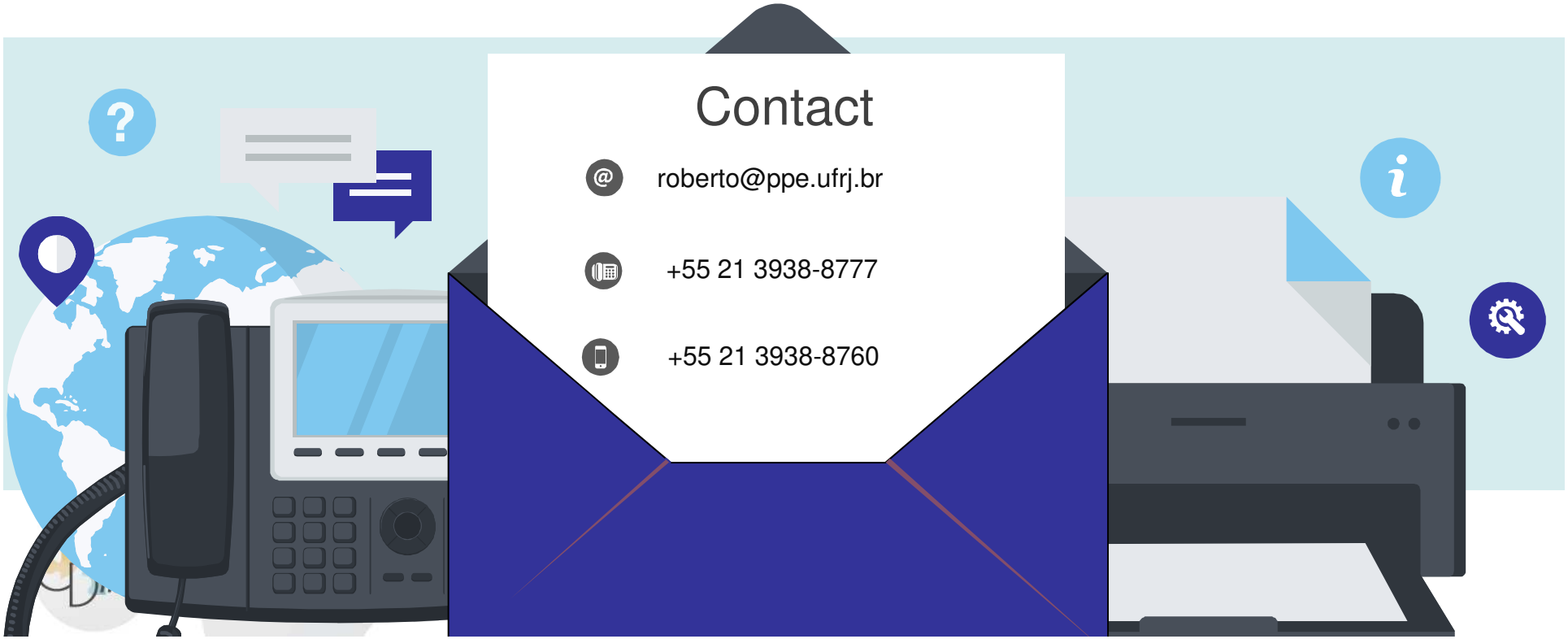

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Thank you!

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Q&A session

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Forthcoming Webinar

CMCC-SISC Webinar:
Antarctic climate variability over the last 2000 years

Presenter: Barbara **Stenni**, Associate professor of Geochemistry, Department of Environmental Sciences, Informatics and Statistics, Ca' Foscari University of Venice

Moderator: Carlo **Barbante**, Director, Istituto per la Dinamica dei Processi Ambientali (IDPA), CNR; President, Italian Society for Climate Sciences (SISC)

26 June 2018
12:30 pm CEST

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