

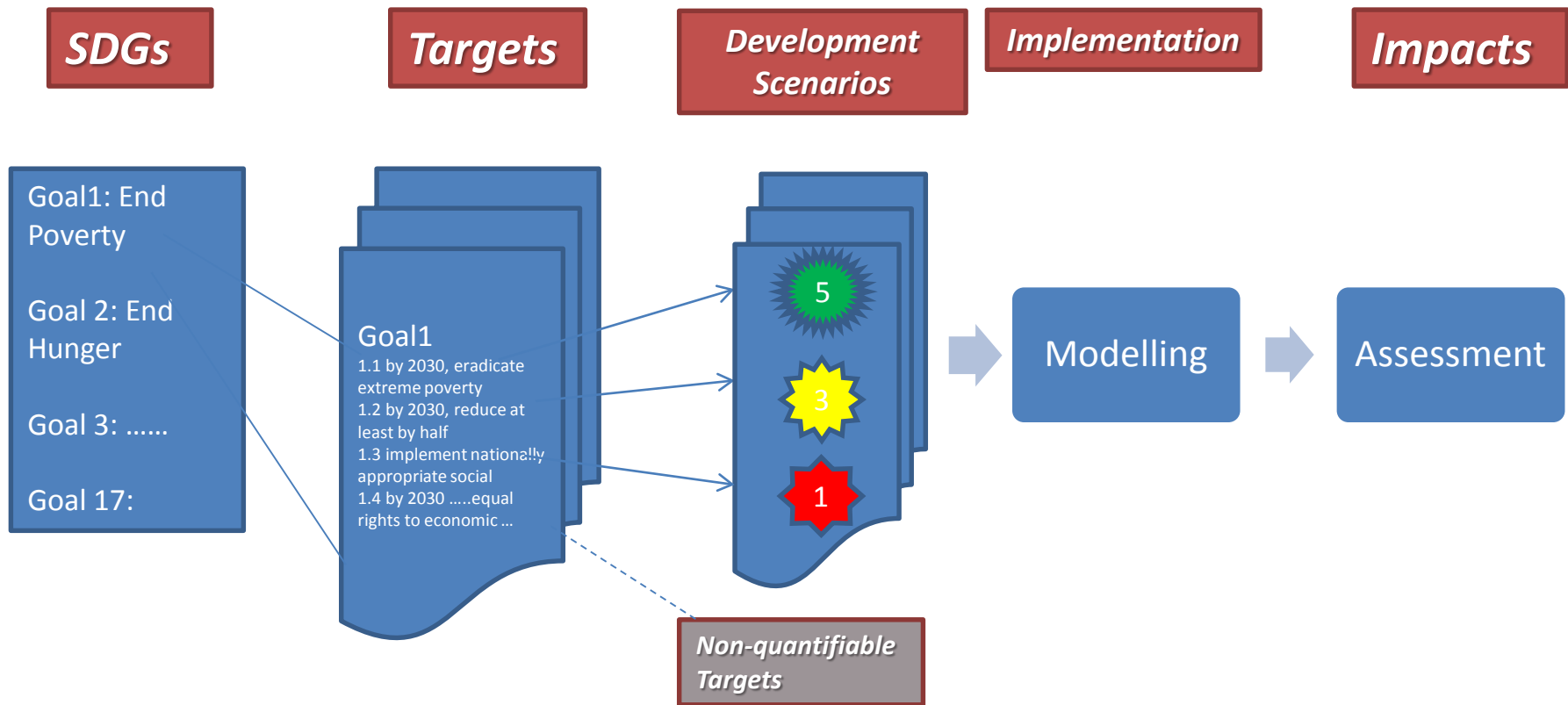
The Land Sector in the context of the SDGs and deep mitigation

Michael Obersteiner

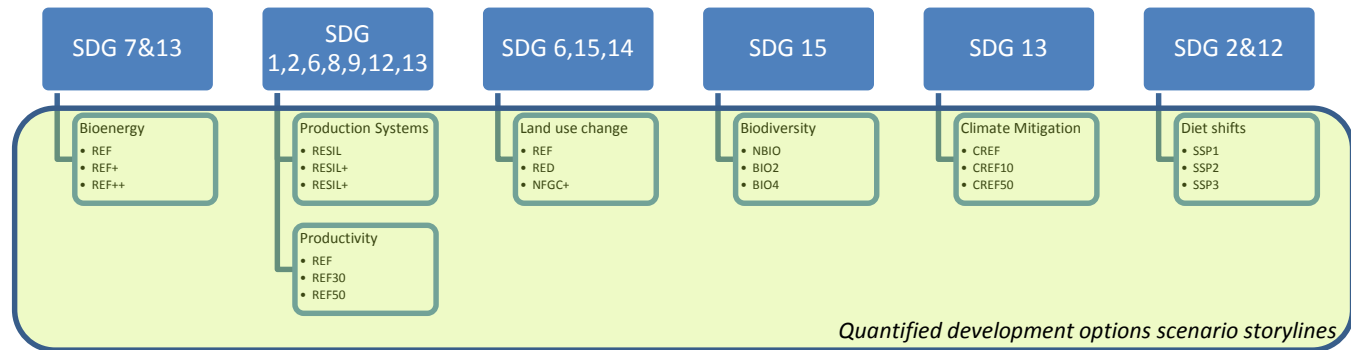
LCS.Rnet

15-16th June, 2015

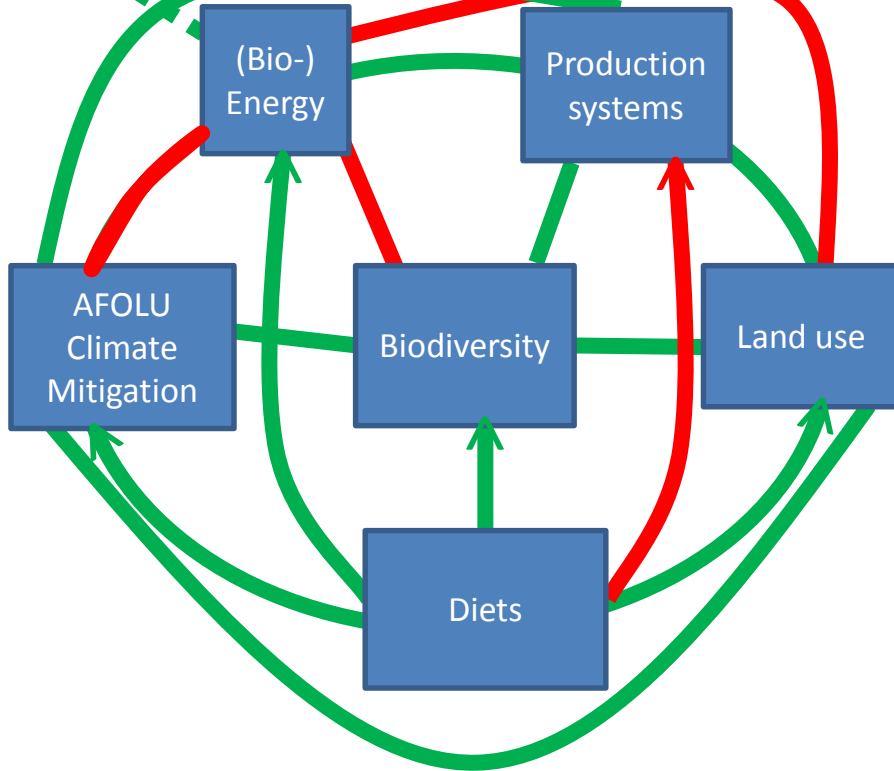
SDG Assessment Framework



Overview of association of storyline domains with SDGs



Energy system



Positive interaction

Negative interaction

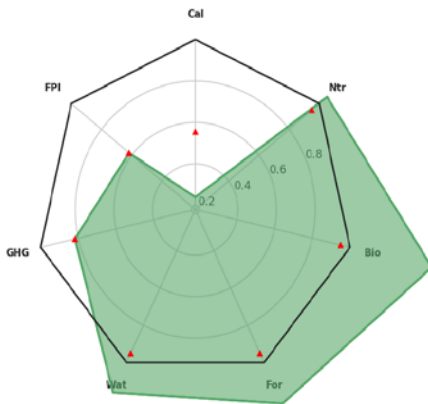
SDG Land System Policies

Policy Domain	Policy	Description
BioEnergy (SDGs 7,13,14)	BAU	SDG-inconsistent
	BioEnergy	2°C target met; nuclear
	BioEnergy+	2°C target met; no nuclear
Agricultural Production Systems (SDGs 1,2,6,8,9,12,14)	Low Resilience	low agility; high waste
	BAU	moderate agility and waste
	High Resilience	high agility; low waste
Agricultural Productivity (SDG 2)	BAU	baseline yield growth
	+30% Yield	baseline+30%
	+50% Yield	baseline+50%
Forest Conservation (SDGs 6,15)	BAU	no restrictions
	Deforestation	no forest loss
	Deforestation+	no forest or grassland loss
Biodiversity Conservation (SDG 6,14,15)	BAU	no protection
	Biodiversity	moderate protection
	Biodiversity+	strict protection
AFOLU GHG Mitigation (SDGs 13,14)	BAU	no tax
	GHG \$10	US \$10 (2000)/tCOeq
	GHG \$50	US \$50 (2000)/tCOeq
Food Consumption (SDGs 2,8,12)	Diet-	Western diet globalization
	BAU	FAO diet projections
	Diet+	reduced meat demand

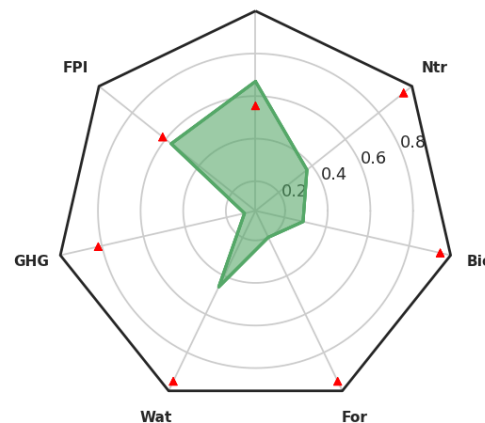
SDG indicators: Evolution of BAU₂₀₃₀

Planetary Indicator	Units	Region	Corresponding SDGs
Total Calorie Intake (Cal)	$[\frac{Cal}{cap \cdot day}]$	SSA	2,3
Food Price Index (FPI)	—	World	2
Emissions (GHG)	$[\frac{MtCO_2eq}{year}]$	World	13
Ag. Water Use (Wat)	$[km^3]$	World	6
Deforestation (For)	$[kha]$	World	6,13,15
Biodiversity Loss (Bio)	$[kha]$	World	15
Fertilizer Use (Ntr)	$[kt]$	World	2,13

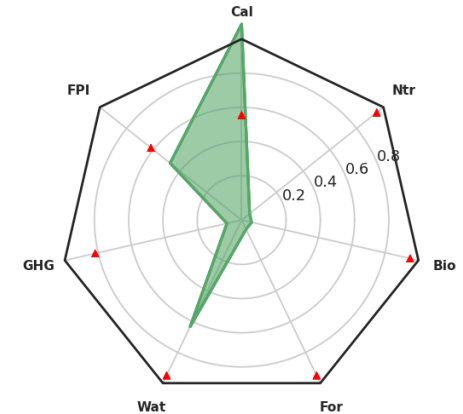
BAU Scenario Tradeoffs (2000)



BAU Scenario Tradeoffs (2030)

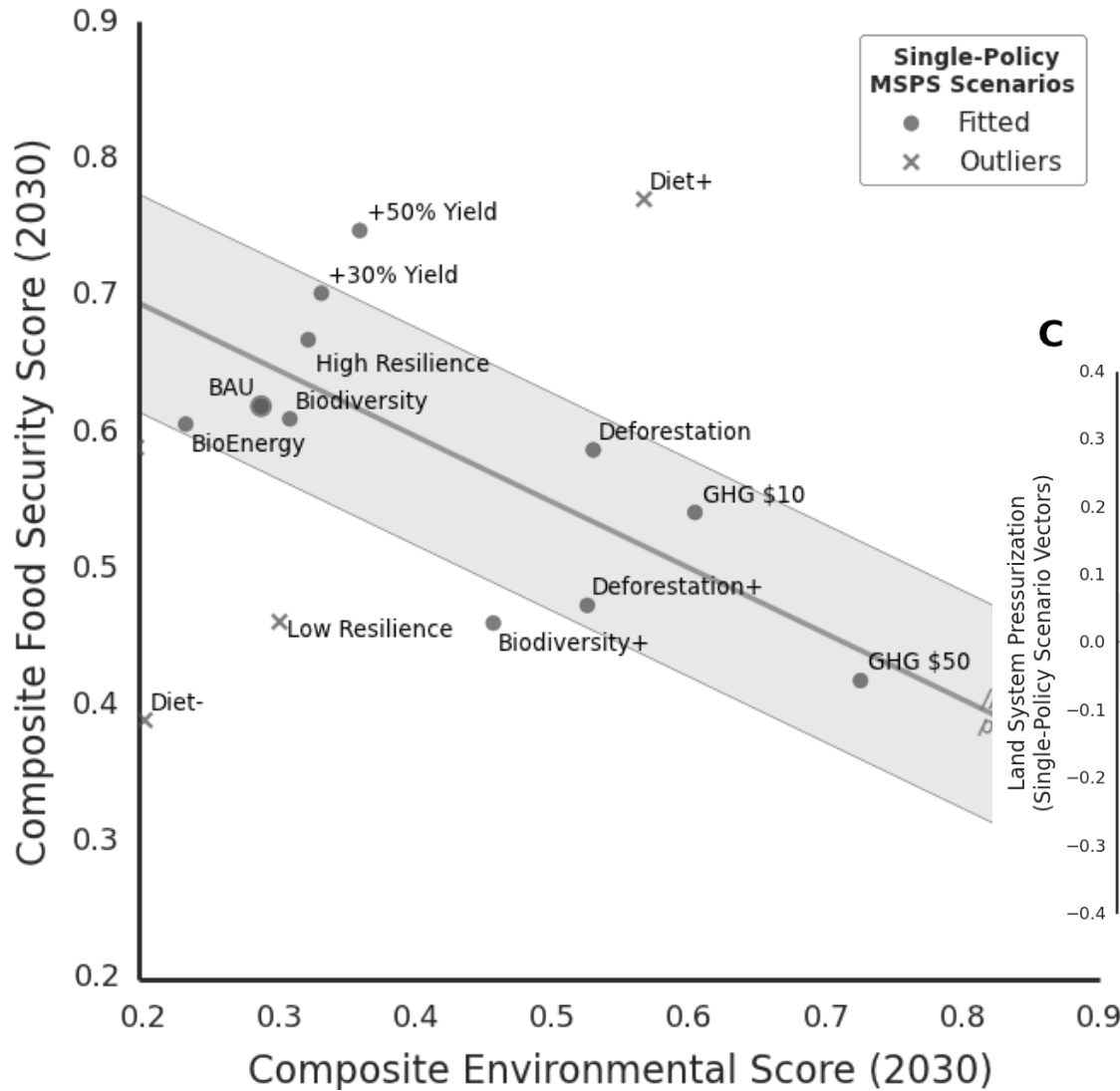


BAU Scenario Tradeoffs (2050)



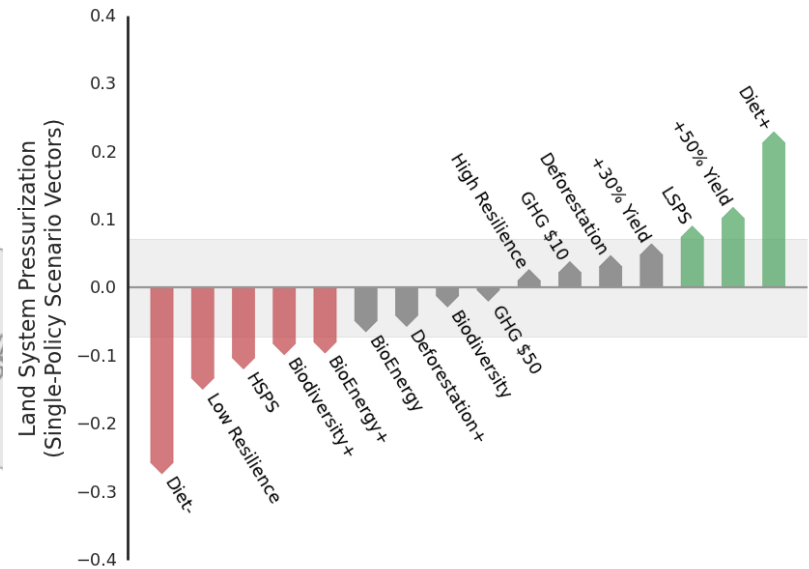
Dynamic analysis of BAU and alternatives on seven critical indicators

Enviro. & Food Security Tradeoffs

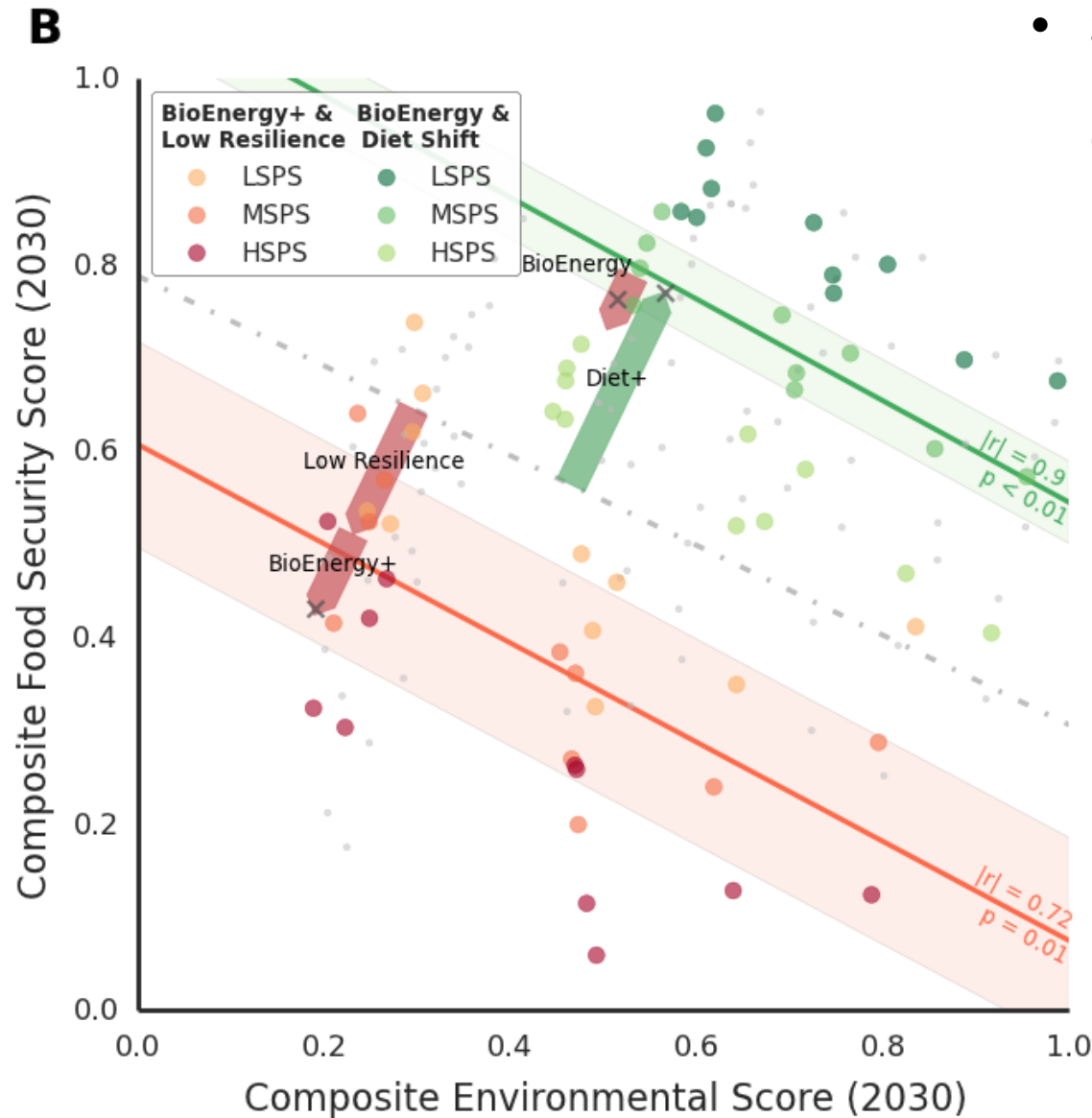


- Pressurization explains divergence from expectation (fit)

C



Depressurizing Strategies

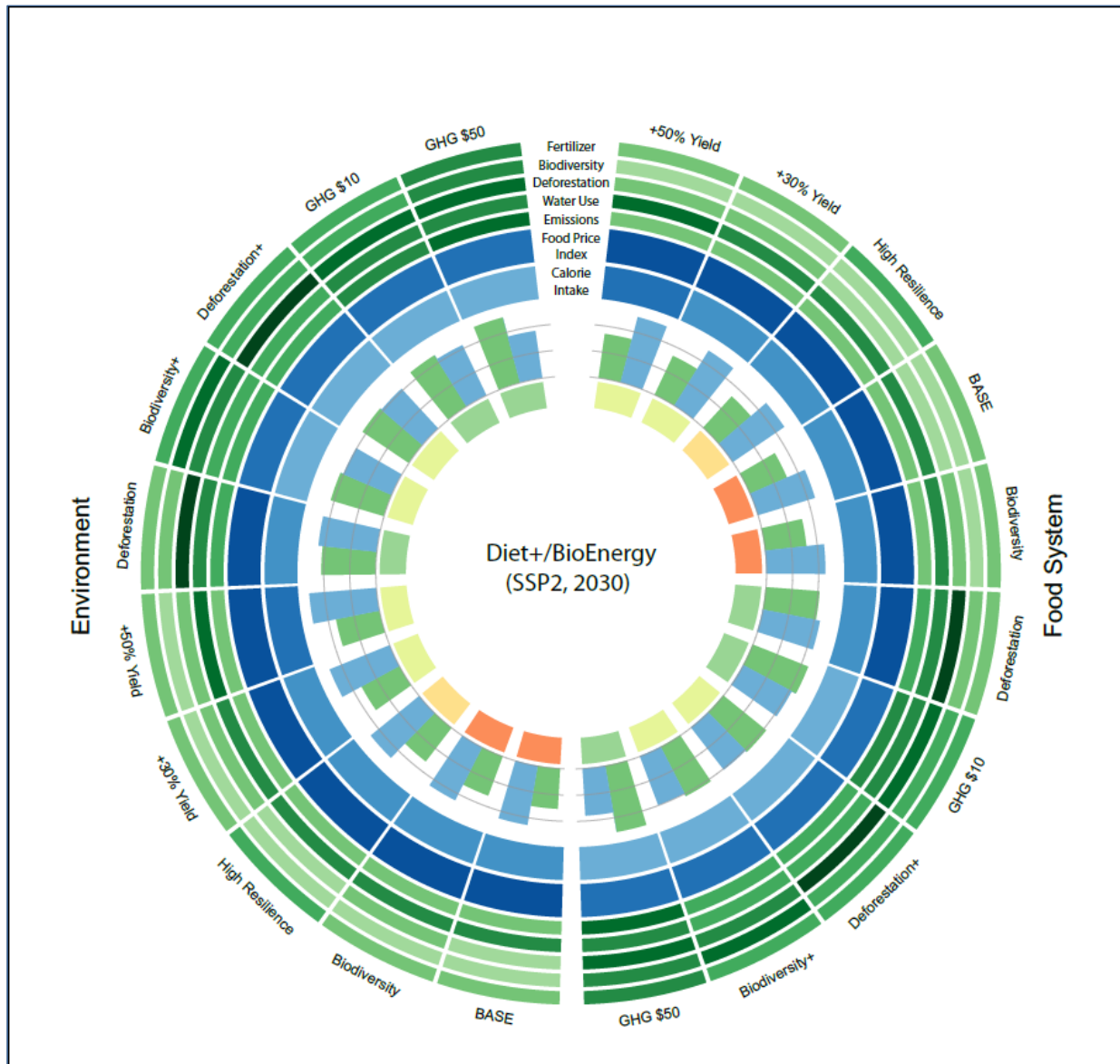


- Still involve tradeoffs, but in an improved range of outcomes

Ranking individual policies in combination



Ranking individual policies in combination

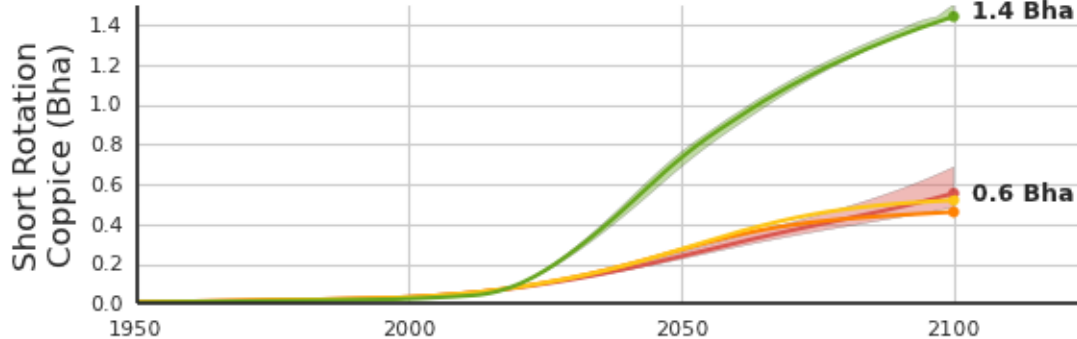
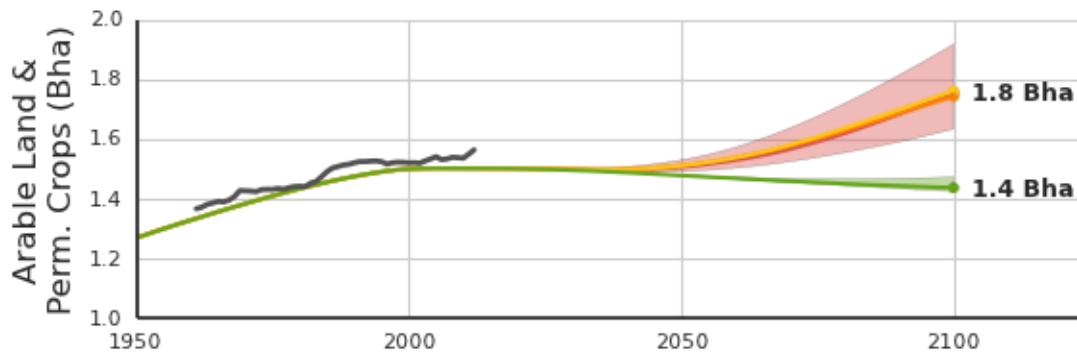
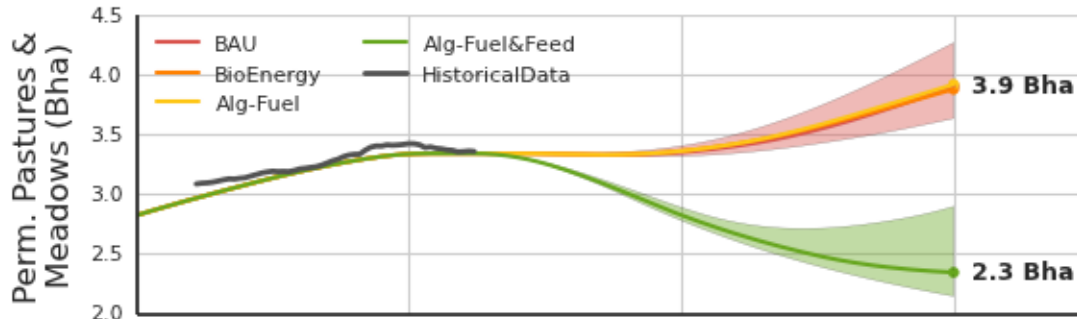


Conclusion

- Superior policy portfolios robustly lead to co-benefit outcomes
- Trade-offs exist but can be managed
- SCP key SDG to deliver consistent policy outcomes

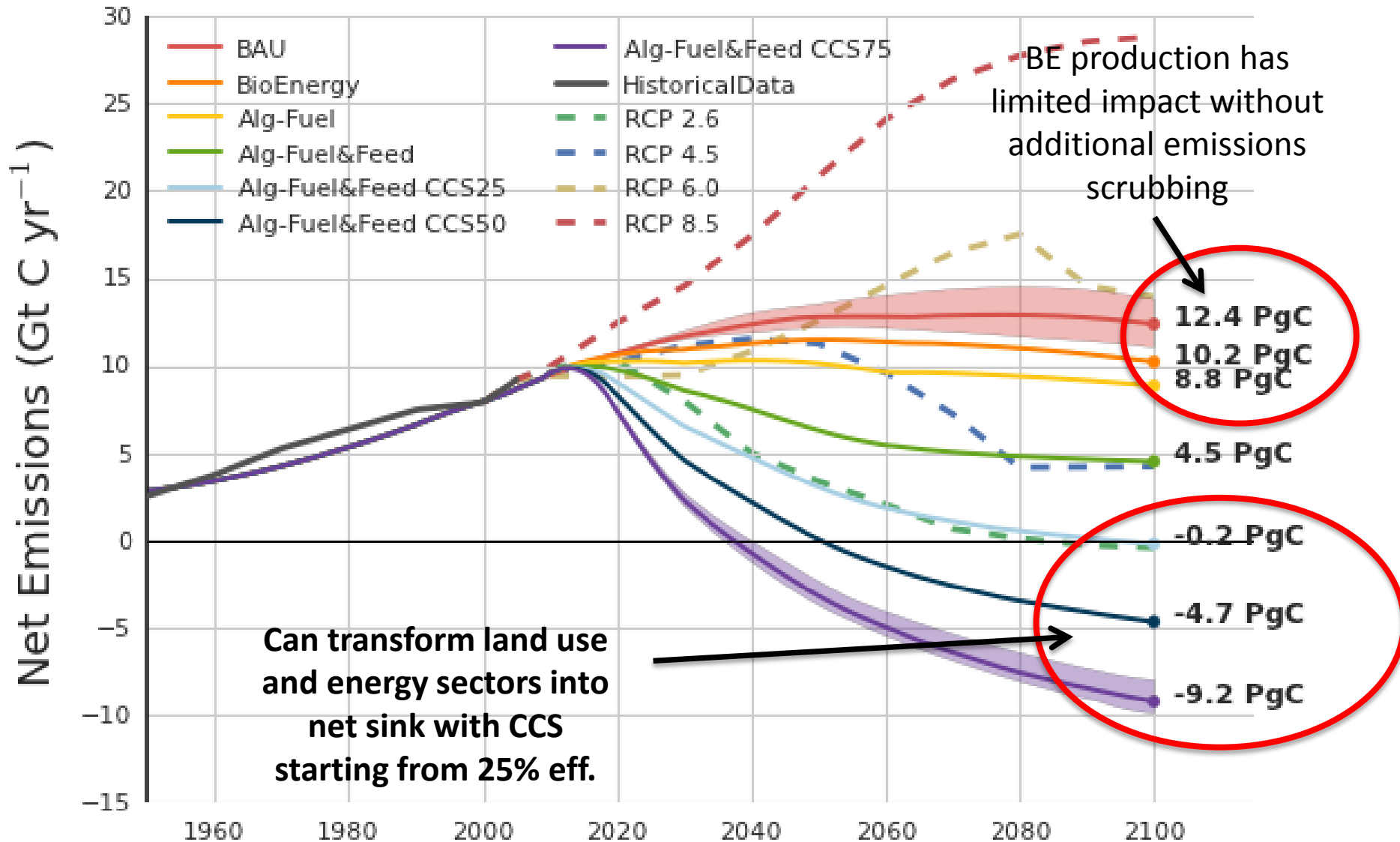
New NETs scenarios

Algal Feedstock

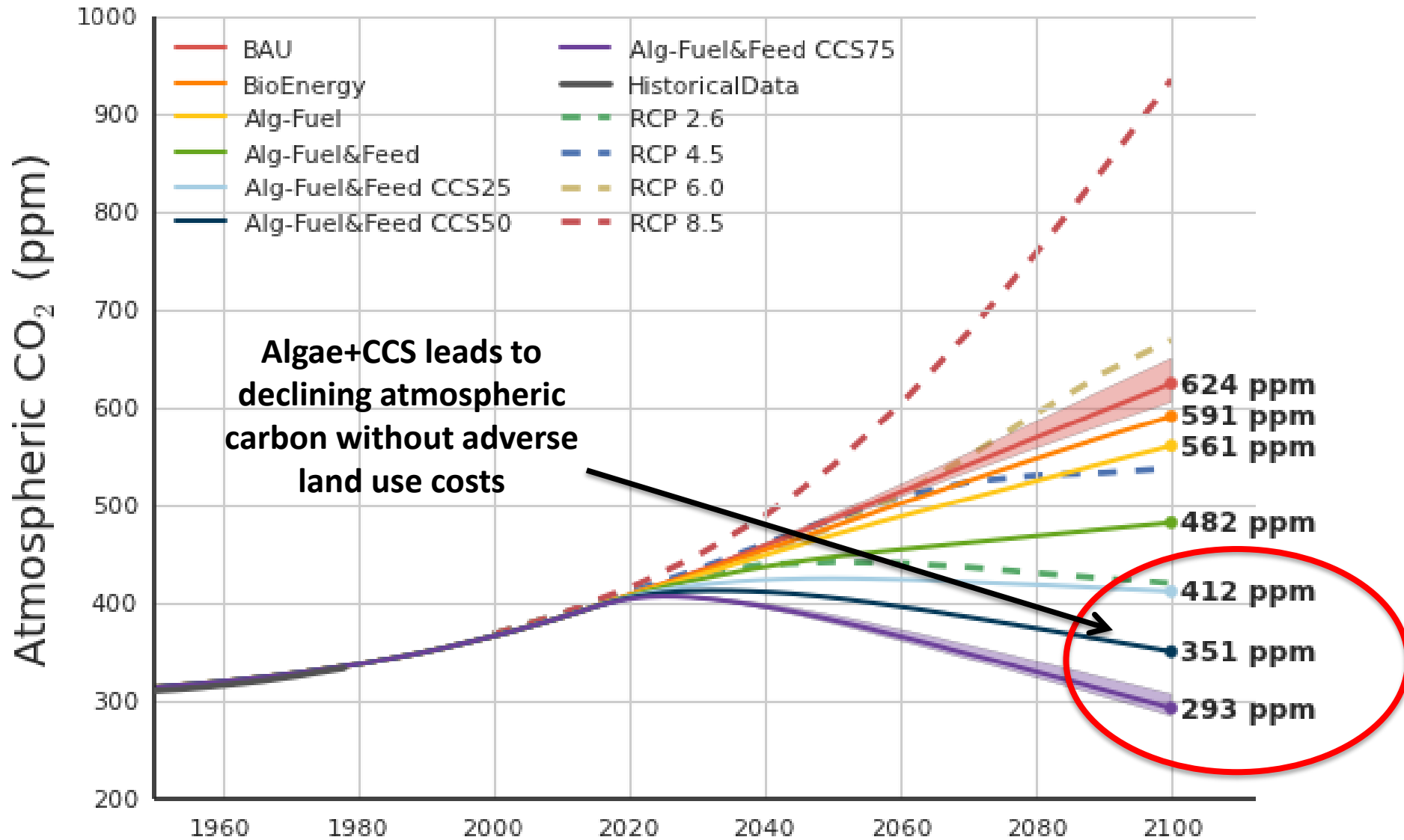


- Livestock can be fed 40% algae w/o effect on food palatability or animal development
- Biomass yields of up to 150 dry tons/ha/year already achieved in Netherlands climate
- Foreseeable demand for 25-50 Mha of algaculture for feedstock in 2100
- By targeting least efficient feedstocks, algae can free over 1.5 billion ha of land from feed production
- What if we set up short rotation coppices on the area?

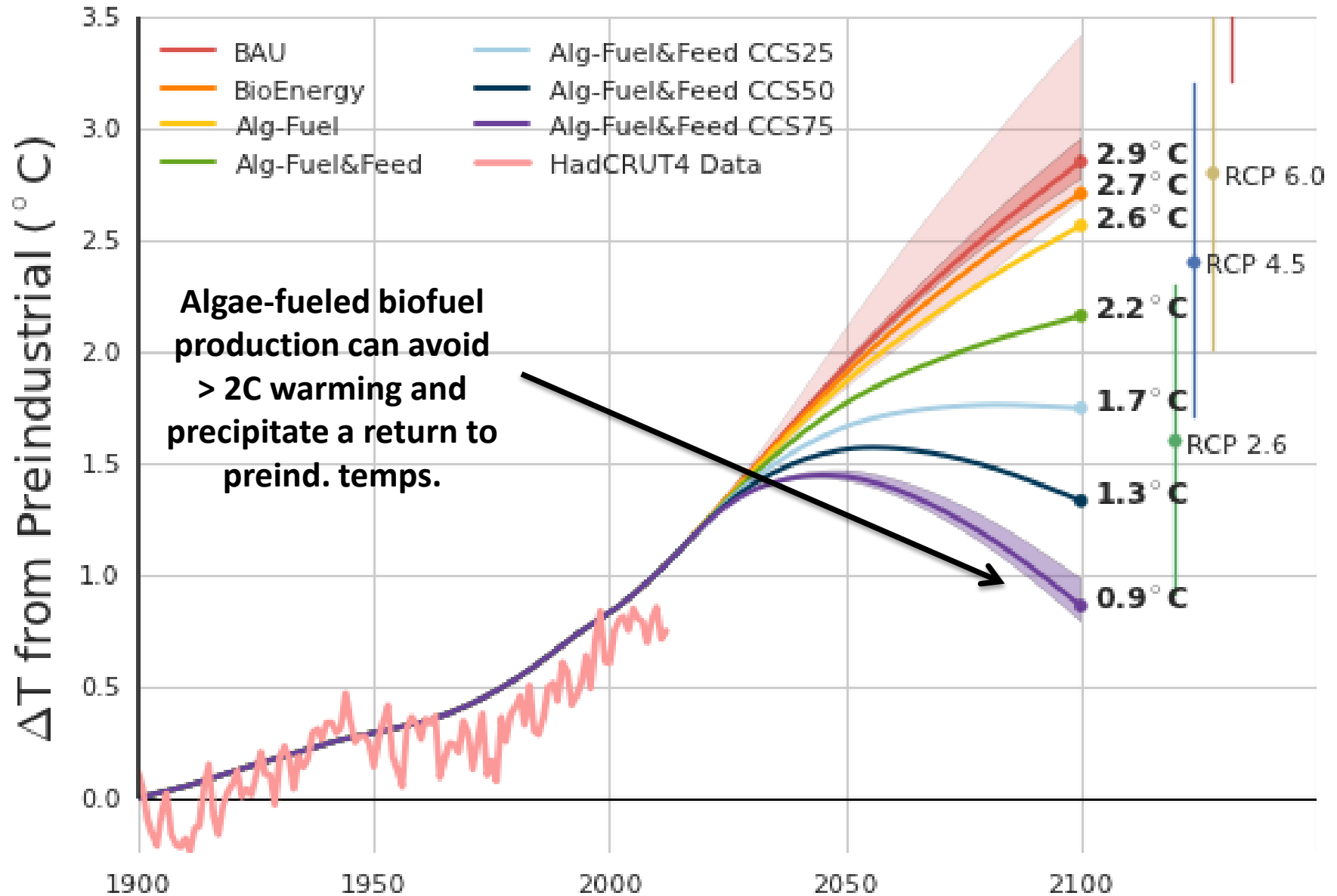
Algae Impact Assessment



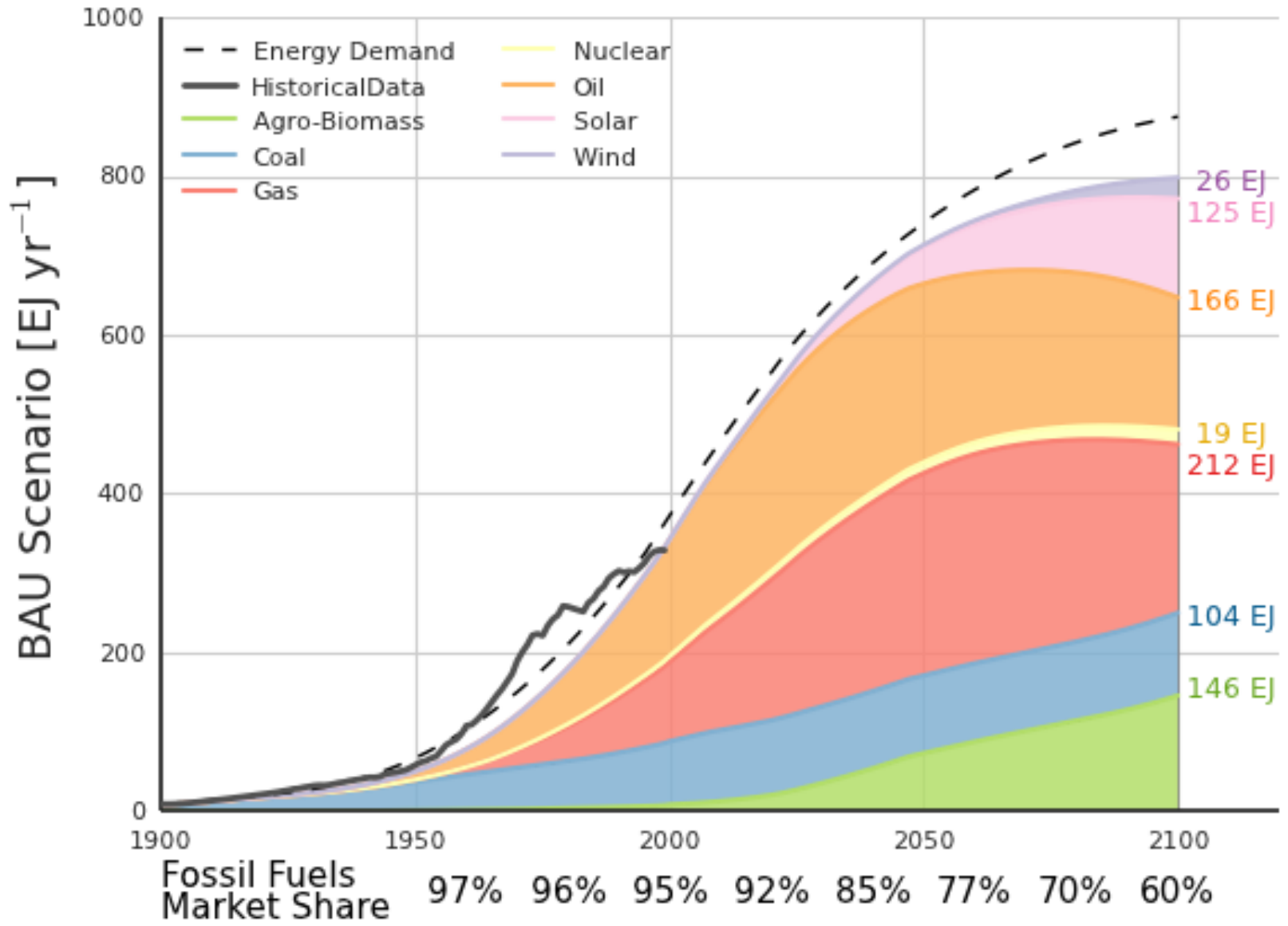
Algae Impact Assessment



Algae Impact Assessment



Primary Energy Production - BAU



Conclusion

- Plan Bing: Need for radically transformative technologies
- Algae and iBECES technologically ready, but not yet competitive
- Large scale co-benefits