# Prospective life cycle assessment of climate and biodiversity impacts of meat-based and plant-forward meals: A case study of Indonesian and German meal options

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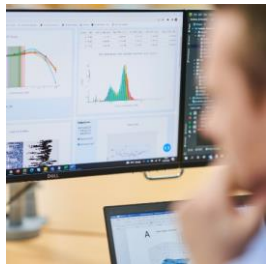
Safety, Environmental & Regulatory Science



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# Goal

- Evaluate the climate & land-based biodiversity footprints of a shift from meat-based to plant-forward meals

**Quantify footprints under current and future conditions (Shared Socioeconomic Pathway scenarios for 2050)**

**Understand potential trade-offs between footprints and the supply of nutrients and calories in meal choices**

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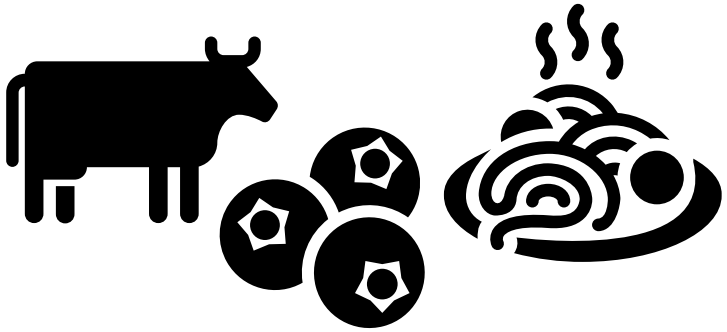
# Meals studied (four)

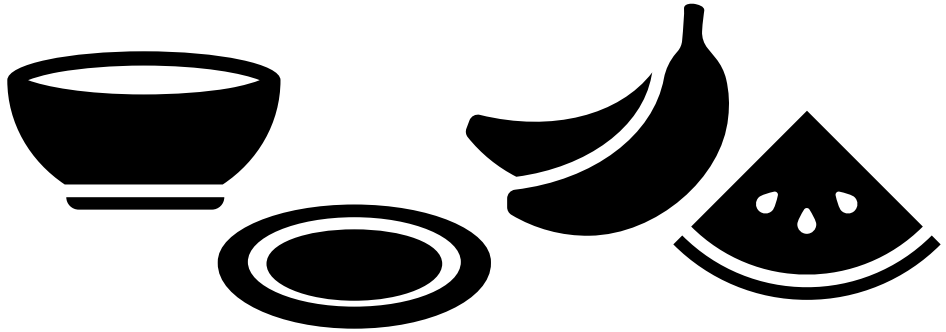

Spaghetti bolognese



Beef

Lentils


Composite meal



Chicken soup, rice, side fried beans, banana

Tofu soup, rice, side of omelette (chicken + beansprouts), melon

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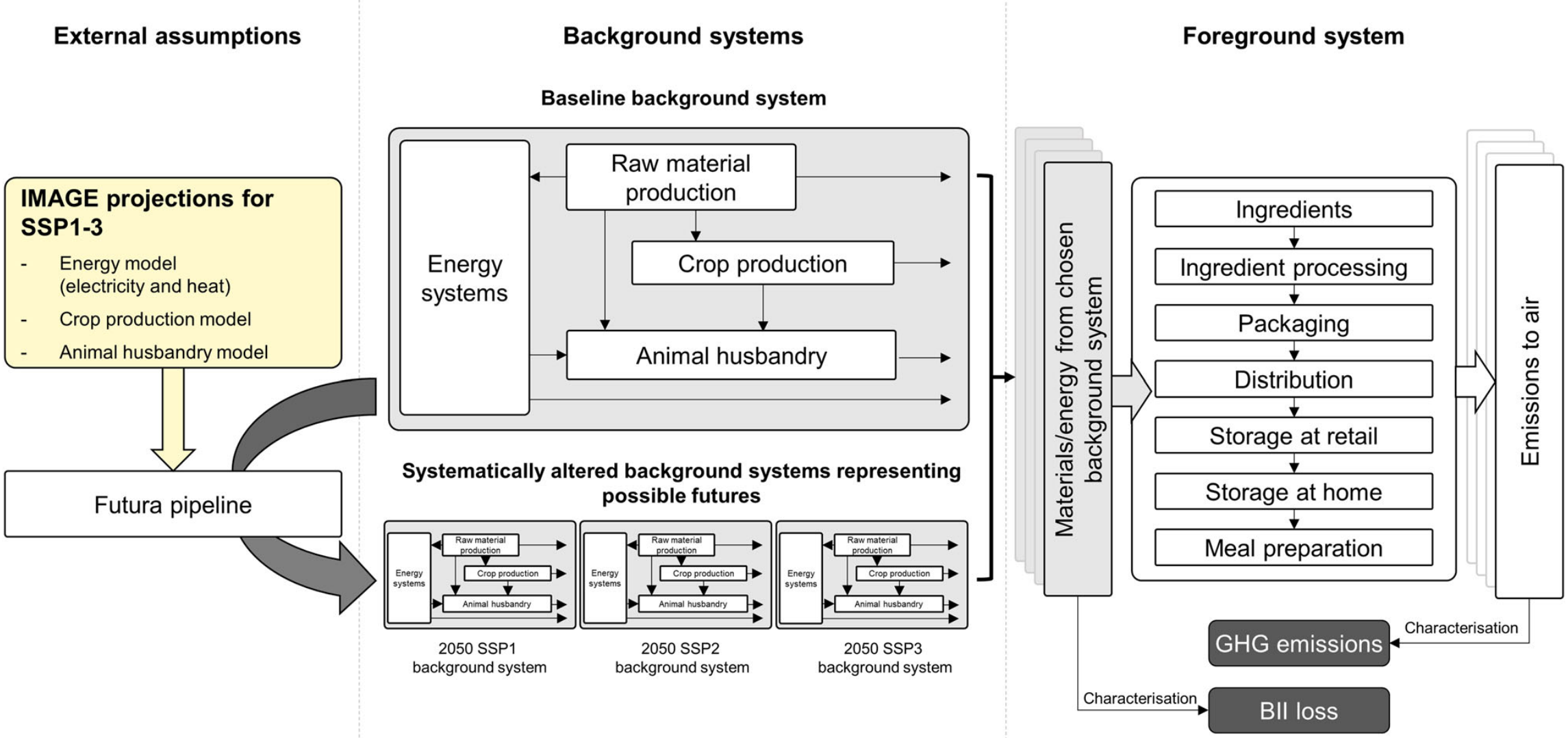
# Functional unit

1. Consumer perspective:
   **"the provision of one prepared serving of a meal"**

2. Nutritional perspective (energetic aspect):
   **"the provision of 100 kcal of energy by a prepared meal"**

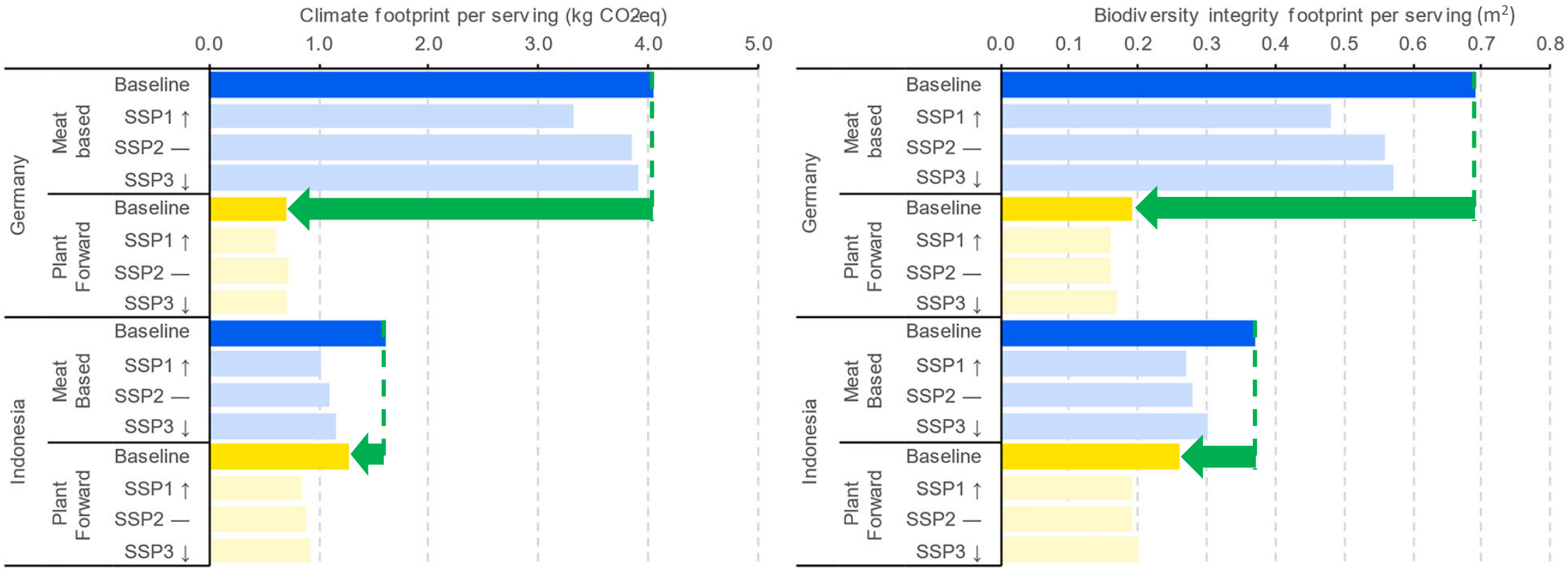
**Contextualisation: NRF15.3 Nutrition Index per meal serving**

# Methodological framework



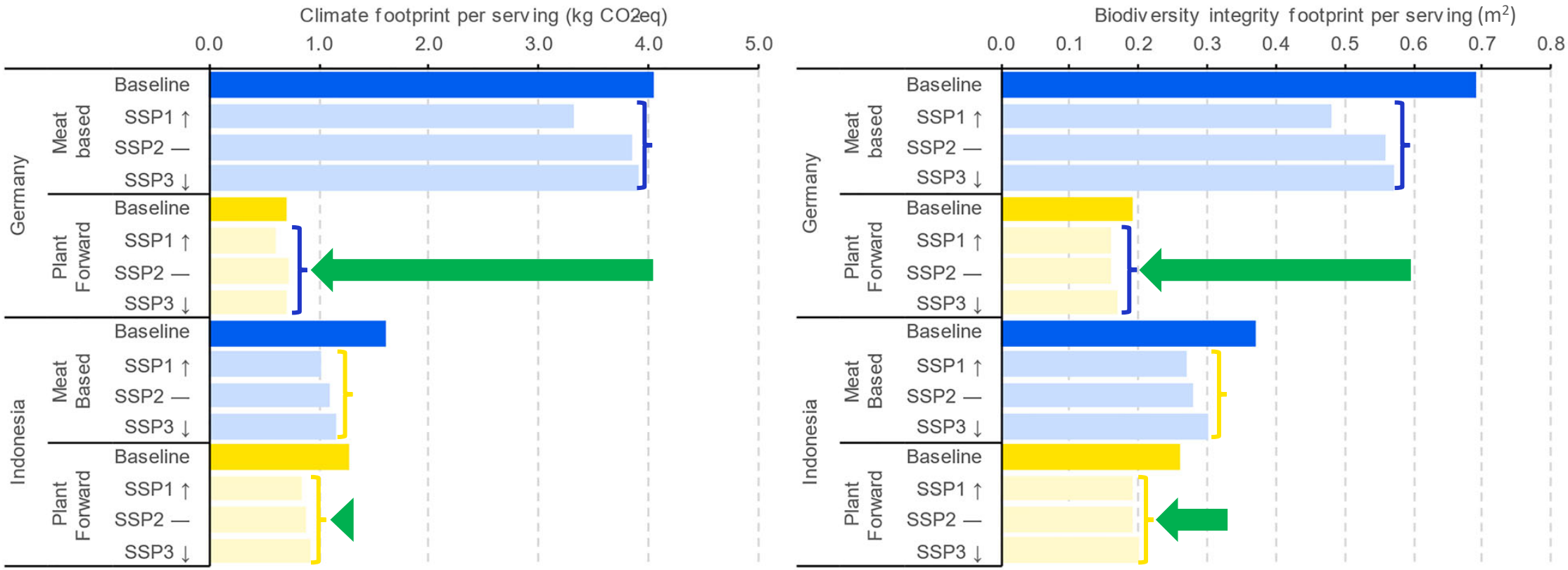

Source; Marquardt et al. (2024)

# Results – Baseline (per serving)




Source; Marquardt et al. (2024)

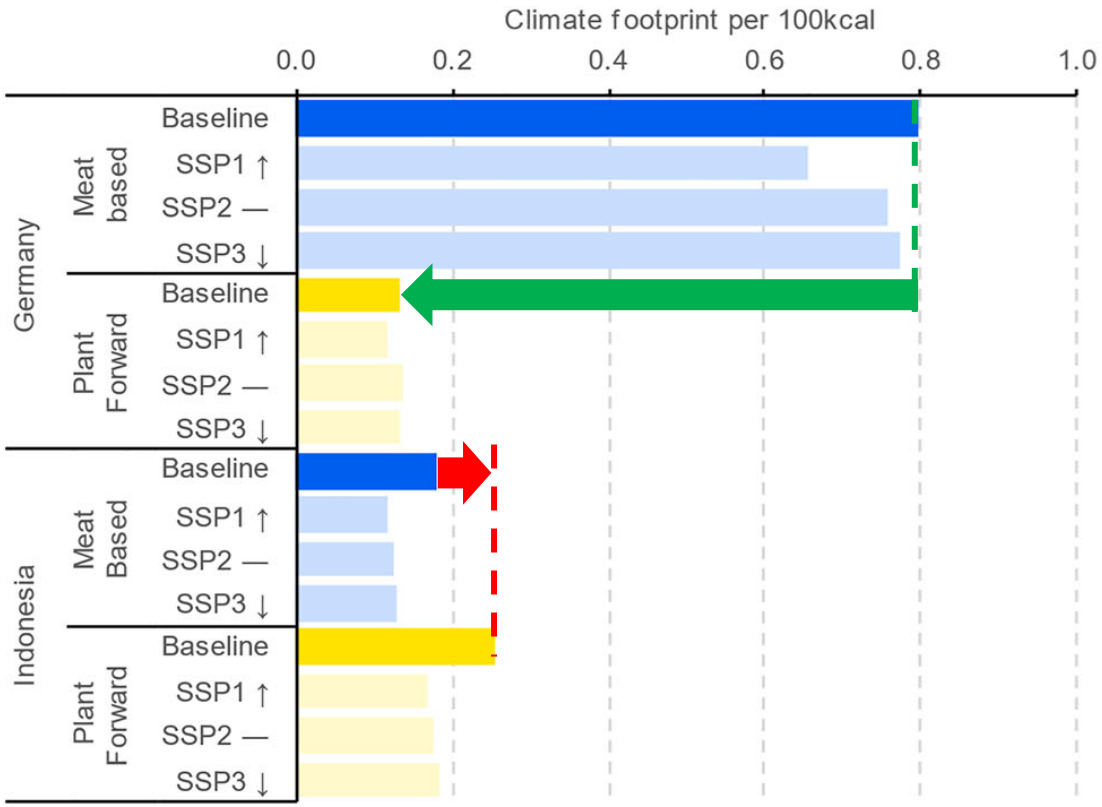
# Results – Future (per serving)

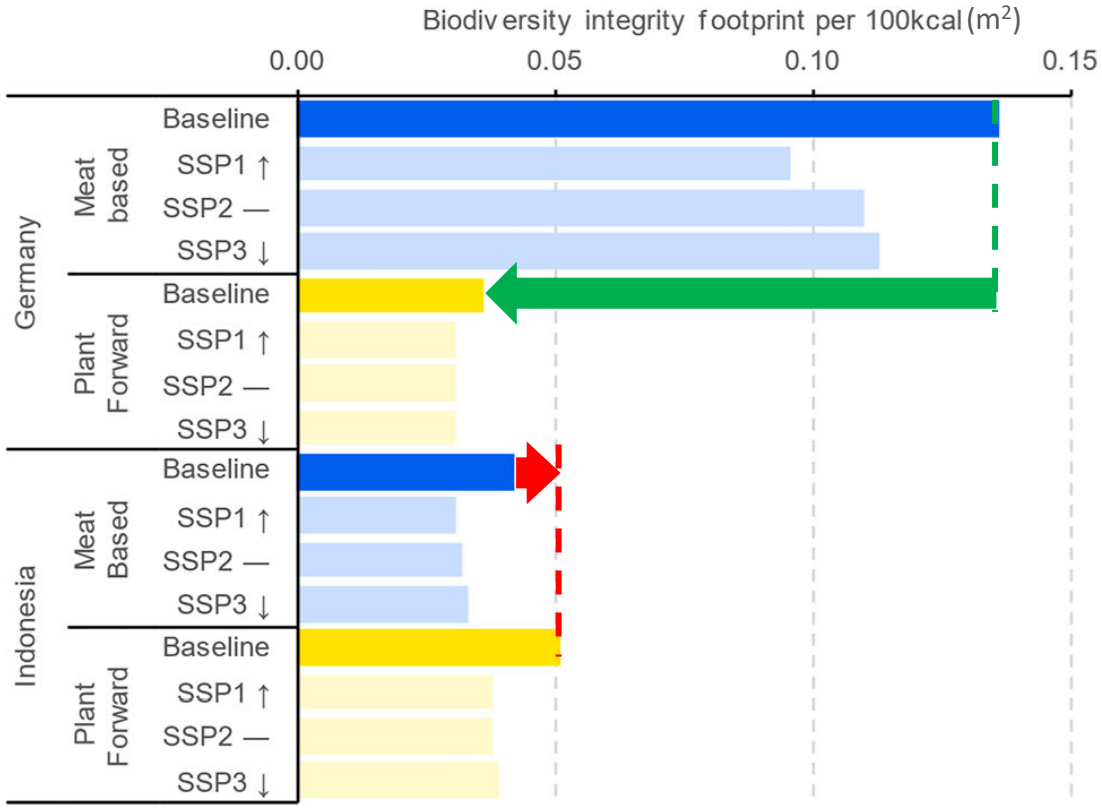



SSP pathways: 1 best scenario (prioritises sustainability), 2 reasonable scenario (business as usual), 3 worst-case scenario (regional rivalry)

Source; Marquardt et al. (2024)

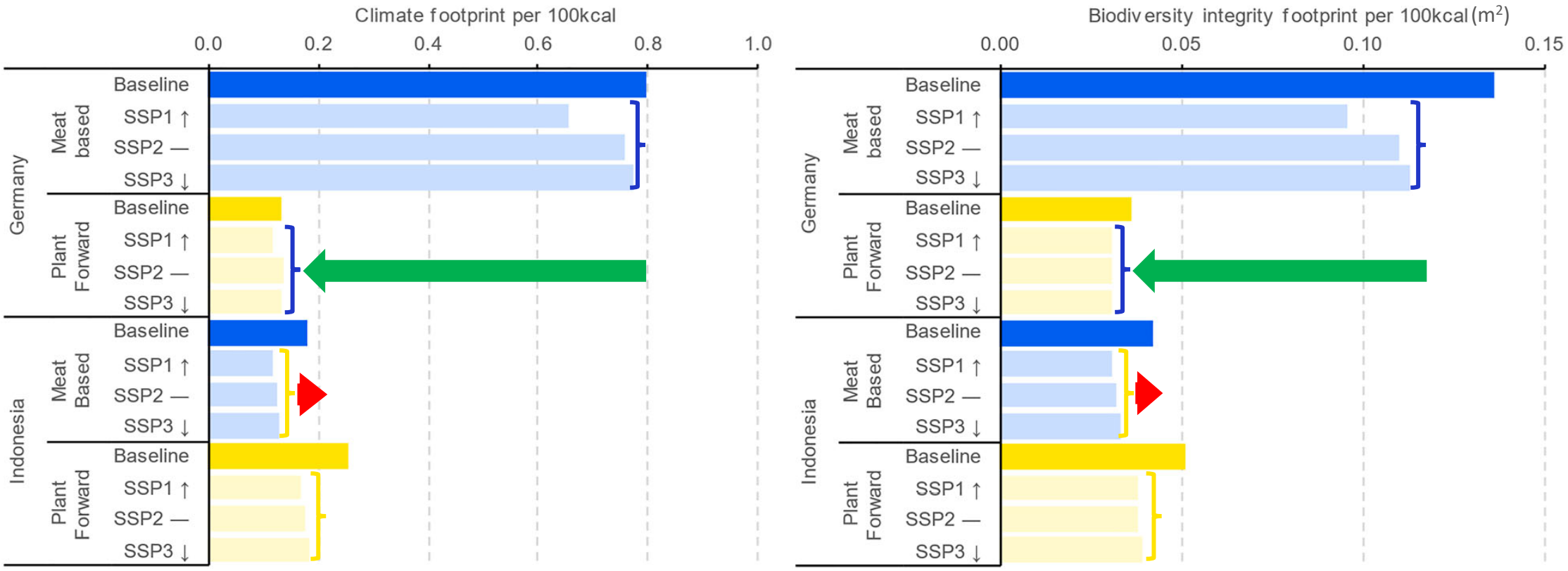
# Results – Baseline (per 100 kcal)




Source; Marquardt et al. (2024)

# Results – Future (per 100 kcal)



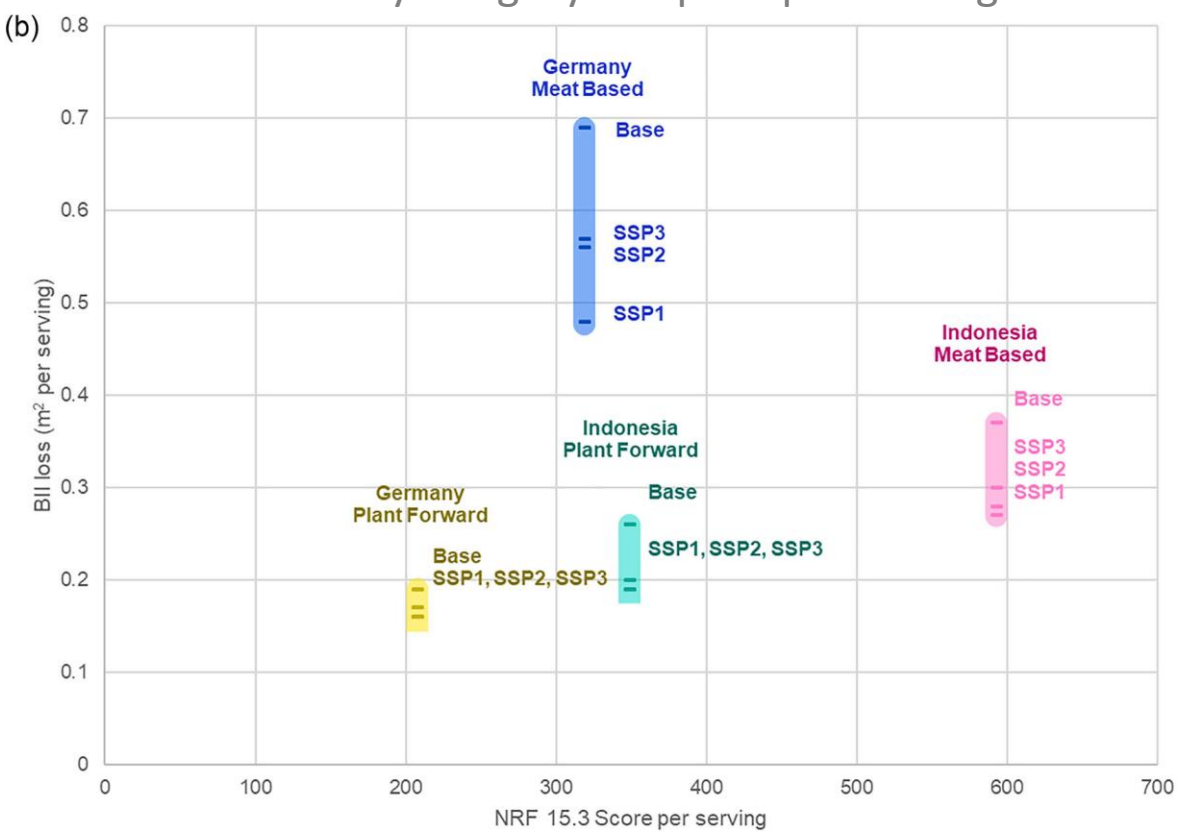

SSP pathways: 1 best scenario (prioritises sustainability), 2 reasonable scenario (business as usual), 3 worst-case scenario (regional rivalry)

Source; Marquardt et al. (2024)

# Contextualisation of results - NRF15.3 Index

Climate Footprint per serving

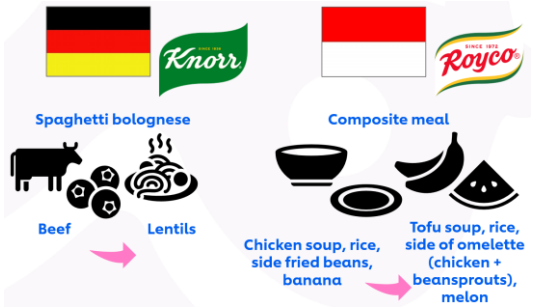

Biodiversity integrity footprint per serving




Source; Marquardt et al. (2024)

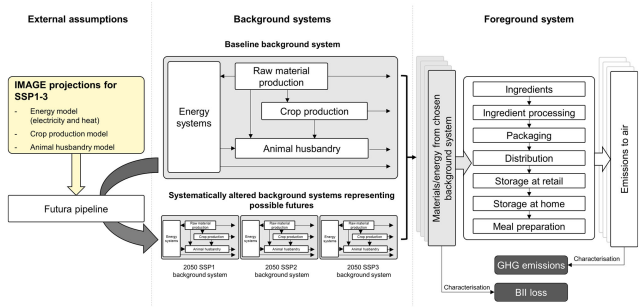
# Conclusions

## Challenge



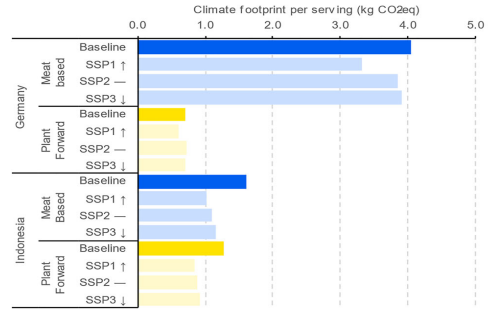

- Evaluate shift from meat-based to plant-forward meals: current & future scenarios
- Understand potential trade-offs in impact & supply of nutrients & calories

## Implementation




- Limited to 4 “real world” culturally relevant meals & 2 indicators
- Adapted background LCI to reflect SSP scenarios using Futura pLCA framework

## Outcome




- Lower environmental footprints for plant-forward meals*
- Need demand-side & supply-side actions
- Nutritional quality not causally correlated to decrease in env impact

*except nutritional FU for ID meal

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# Thank You

# Any questions?

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