

# Perspective National WEF Security Analysis 2050: Scenario Based Nexus Modeling

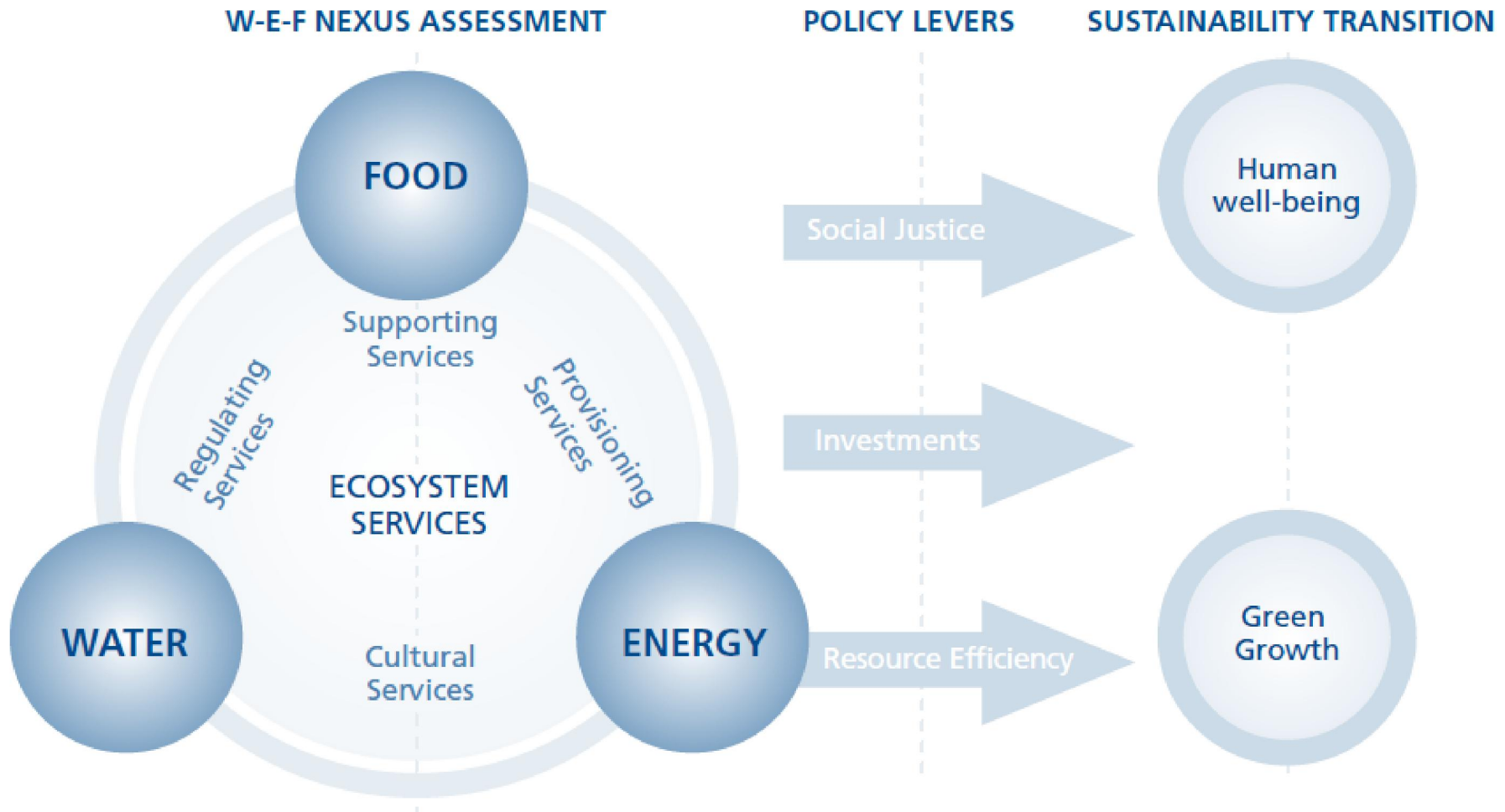
Contribution to Ethiopia 2050 Vision: Grand Challenges  
and Opportunities

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# 1. Ethiopian Grand Challenges



## 2. WEF Questions?

Can Ethiopia achieve WEF security by 2030 and 2050?



What would be the consequence on the land and water resources bases



What does It take for Ethiopia, to develop and sustain WEF security without significantly affecting the resources base (Sustainable Scenario)?

## 3. Selected Scenarios

### Scen1

#### **BAUScen – Business as Usual Scenario**

- When per capita WEF consumptions continue as in the past but socio-economic drivers continue to grow

### Scen2

#### **RV2030Scen - Revised Middle Income Country by 2030**

- Achieving 100% Food, Water and Energy access
- Middle income per capita access

### Scen3

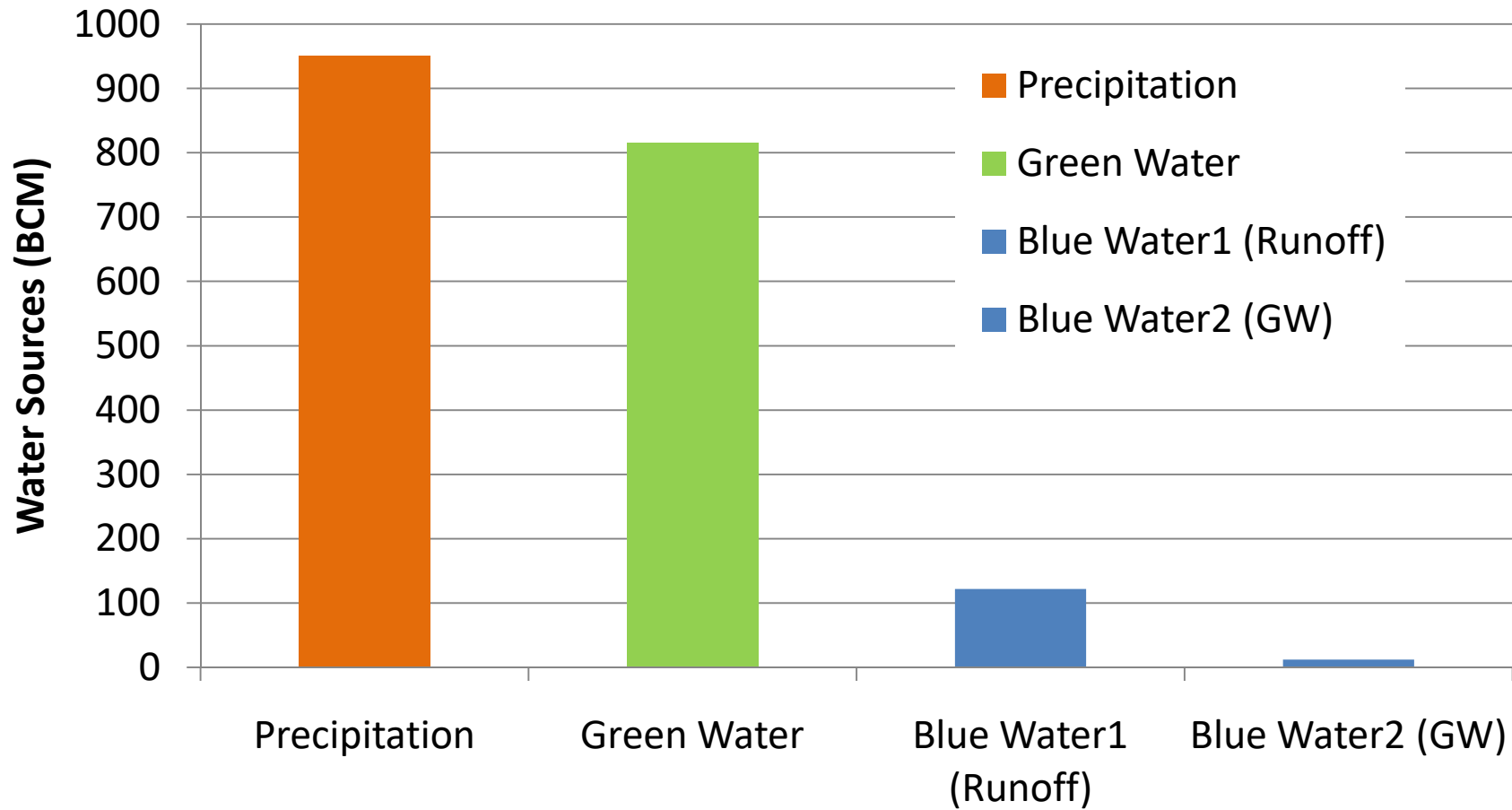
#### **AGriScen – Agricultural Intensification Scenario**

- Achieving 100% Water and Energy Access,
- Middle income per capita access
- Doubling Agricultural Productivity (Both Rainfed and Irrigation)

## 4. Drivers

Year	Population Growth rate (%)	Total Population (%)	Urban. Rate (%)	Total Urban Population (%)	Total Rural population (%)
2014	2.6	97.4			
2015	2.6	99.8		19.4	80.5
<b>2030</b>	<b>2.03</b>	<b>139.6</b>	<b>4.1</b>	<b>32.5</b>	<b>102.1</b>
<b>2050</b>	<b>1.30</b>	<b>190.8</b>	<b>3.02</b>	<b>74.5</b>	<b>116.3</b>

# 5. Resources - Water



## 5. Resources- Land

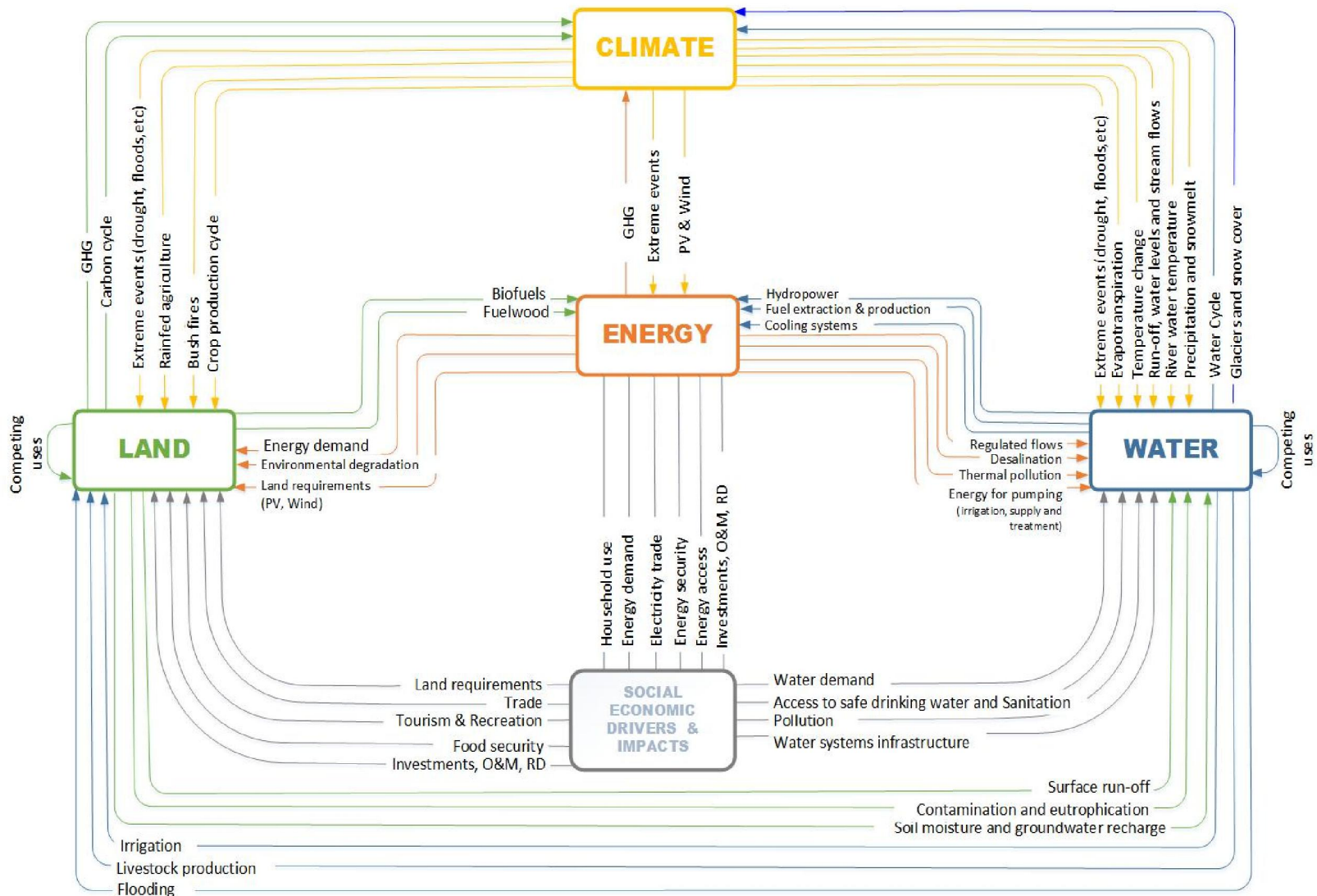
Lan-Use type	Area (mil. ha)
Forests	12.50 (12.5%)
Permanent meadows and pastures	19.96 (19.96%)
Crop lands	16.30 (16.30%)
Other lands(includes Urban areas , Built up areas, and barren lands)	51.25 (51.24%)
Total land	100 (100 %)

## 5. Resources - Power Capacity

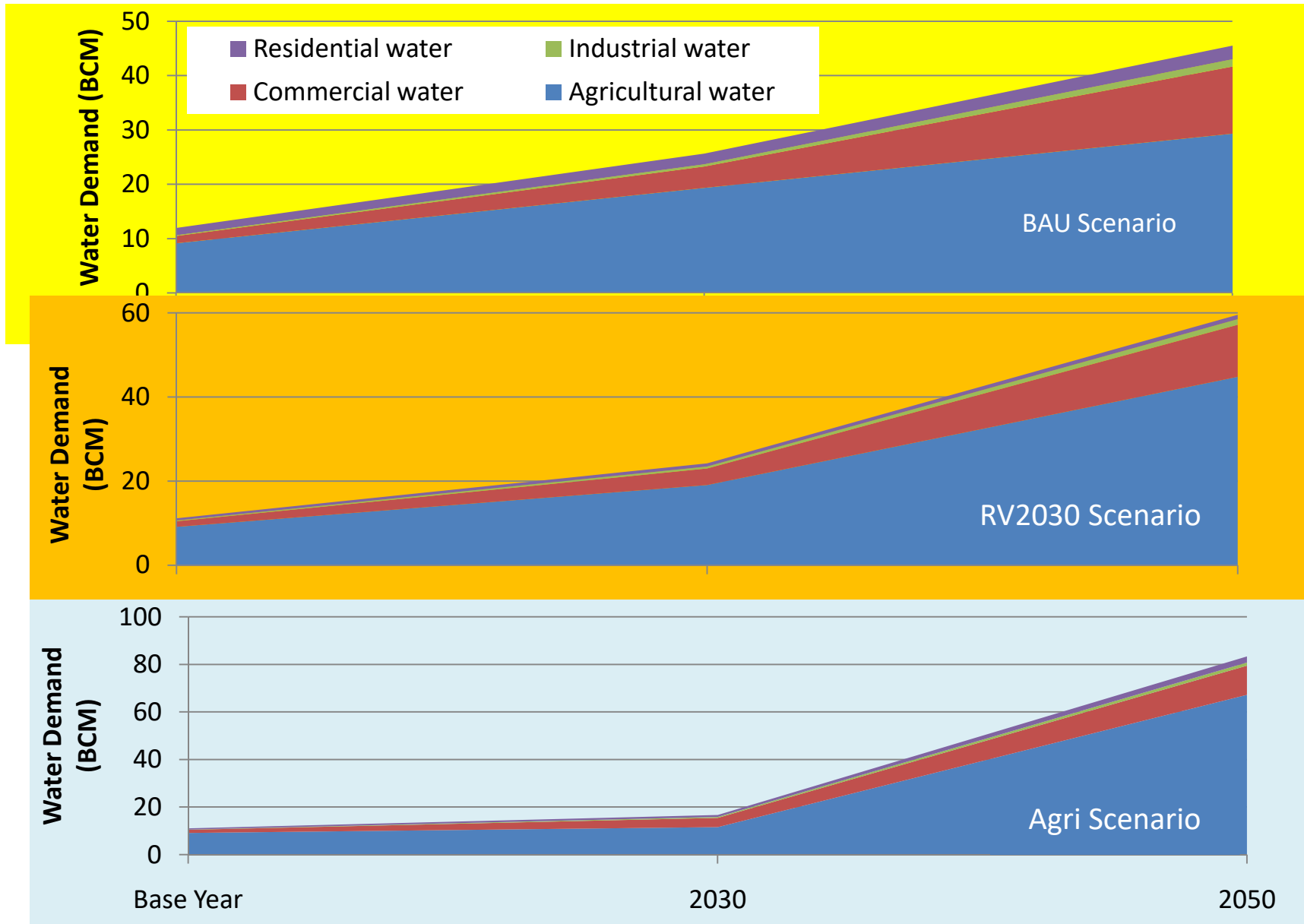
Power Generating Plant	Maximum Potential
Hydropower	45GW
Geothermal	10GW
Wind	10,000GW
Solar	5.5kw/m <sup>2</sup> /day
Wood (Biomass)	1,120 million tone/year
waste	20 million tone/year



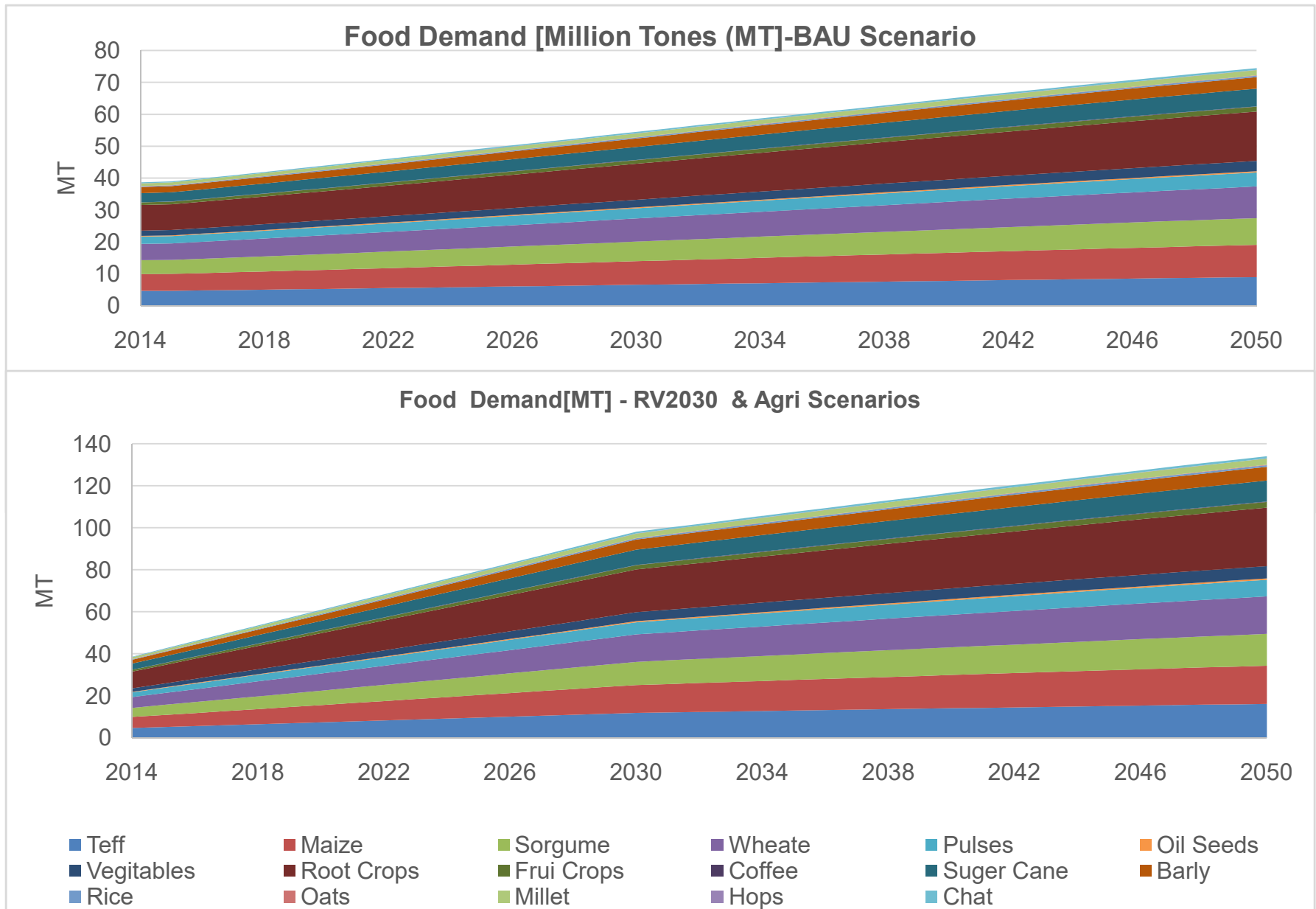
# 6. Method: CLEWS WEF Nexus Modeling



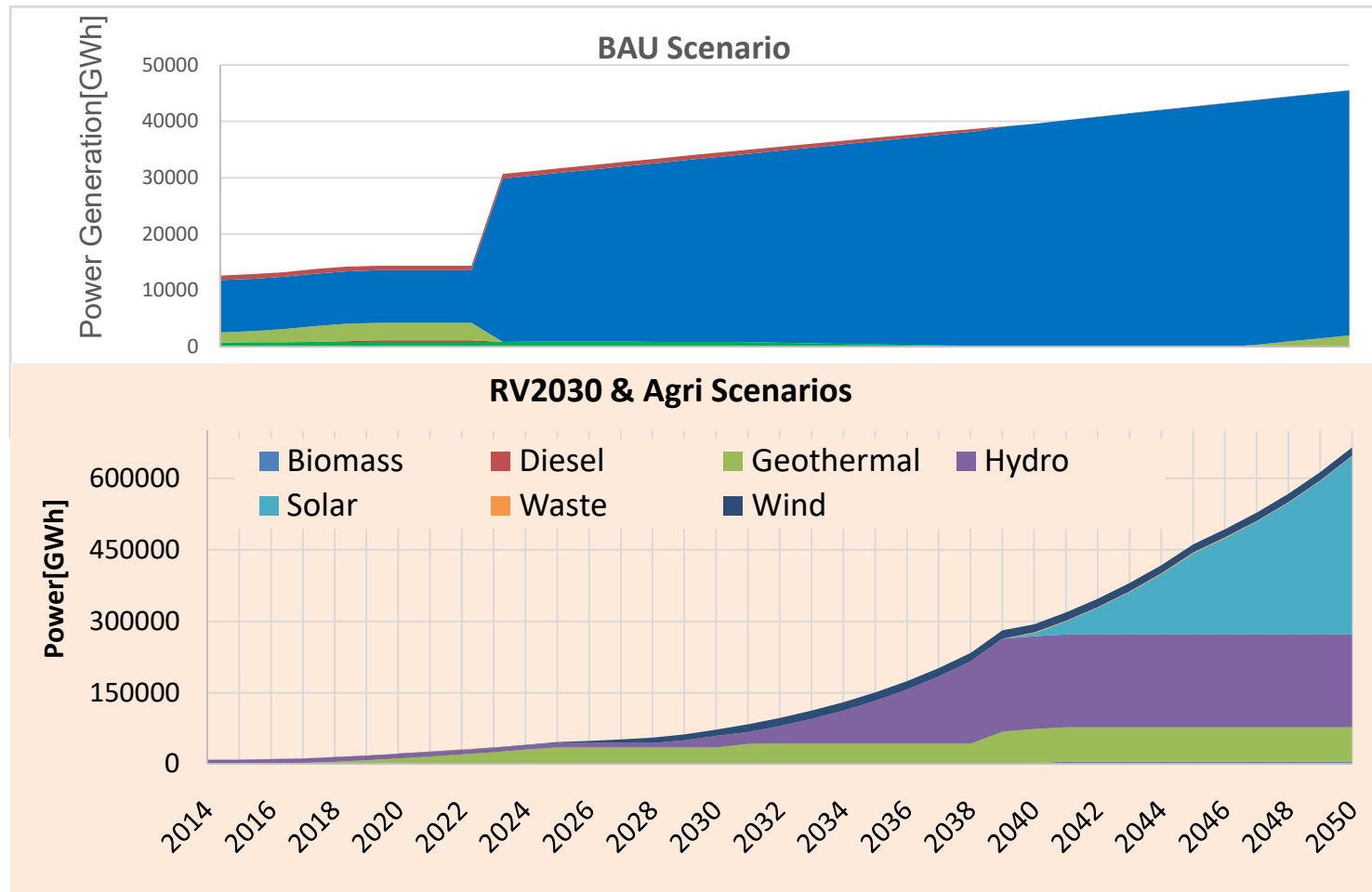
# 7. Future Total Demand: Water



# 7. Future Total Demand: Food Demand



# 7. Future Total Demand: Energy

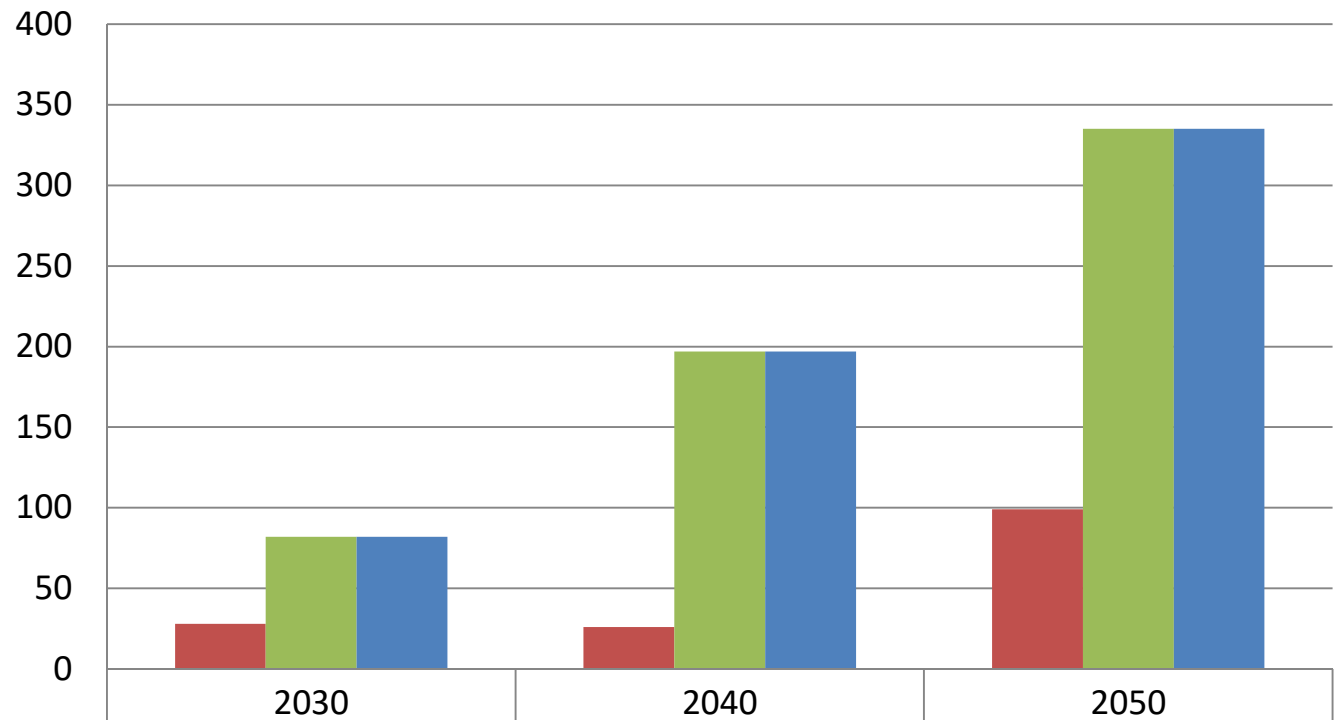


*-Ethiopia has adequate renewable energy resources to develop and satisfy the growing demand until 2050.*

**-The energy mix is dominated by hydropower and shifts to solar energy after 2040.**

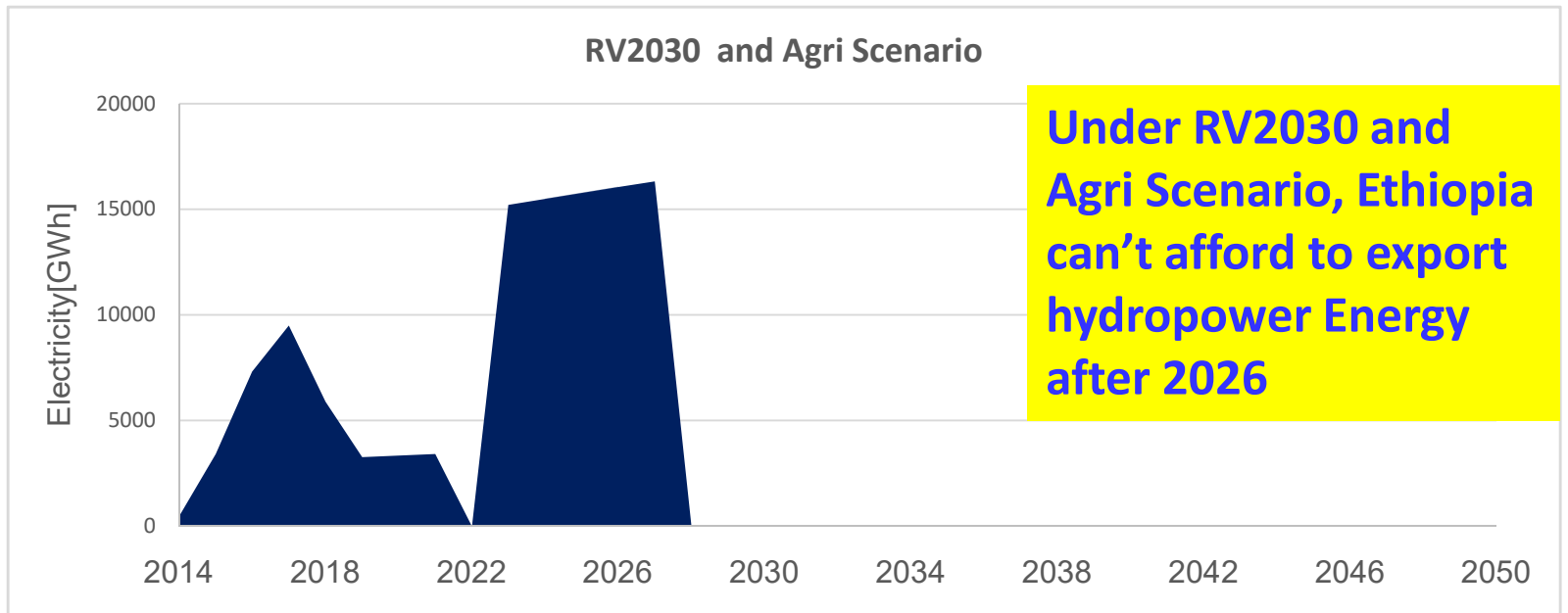
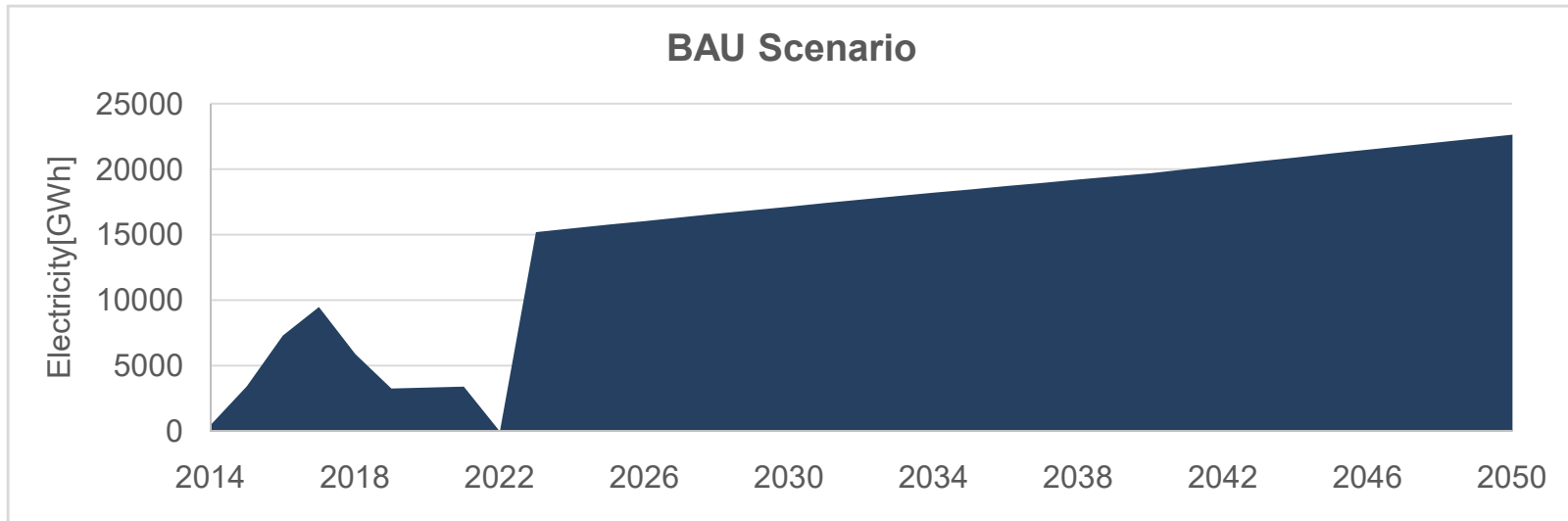
# 8.1 Key Features: Cost of Energy Generation

Energy generation (Infrastructure + generation + distribution) requires huge capital



■ BAU Scenario Capital Investment [Bill. US \$]	28	26	99
■ RV2030 Scenario Capital Investment [Bill. US \$]	82	197	335
■ Agri Scenario Capital Investment [Bill. US \$]	82	197	335

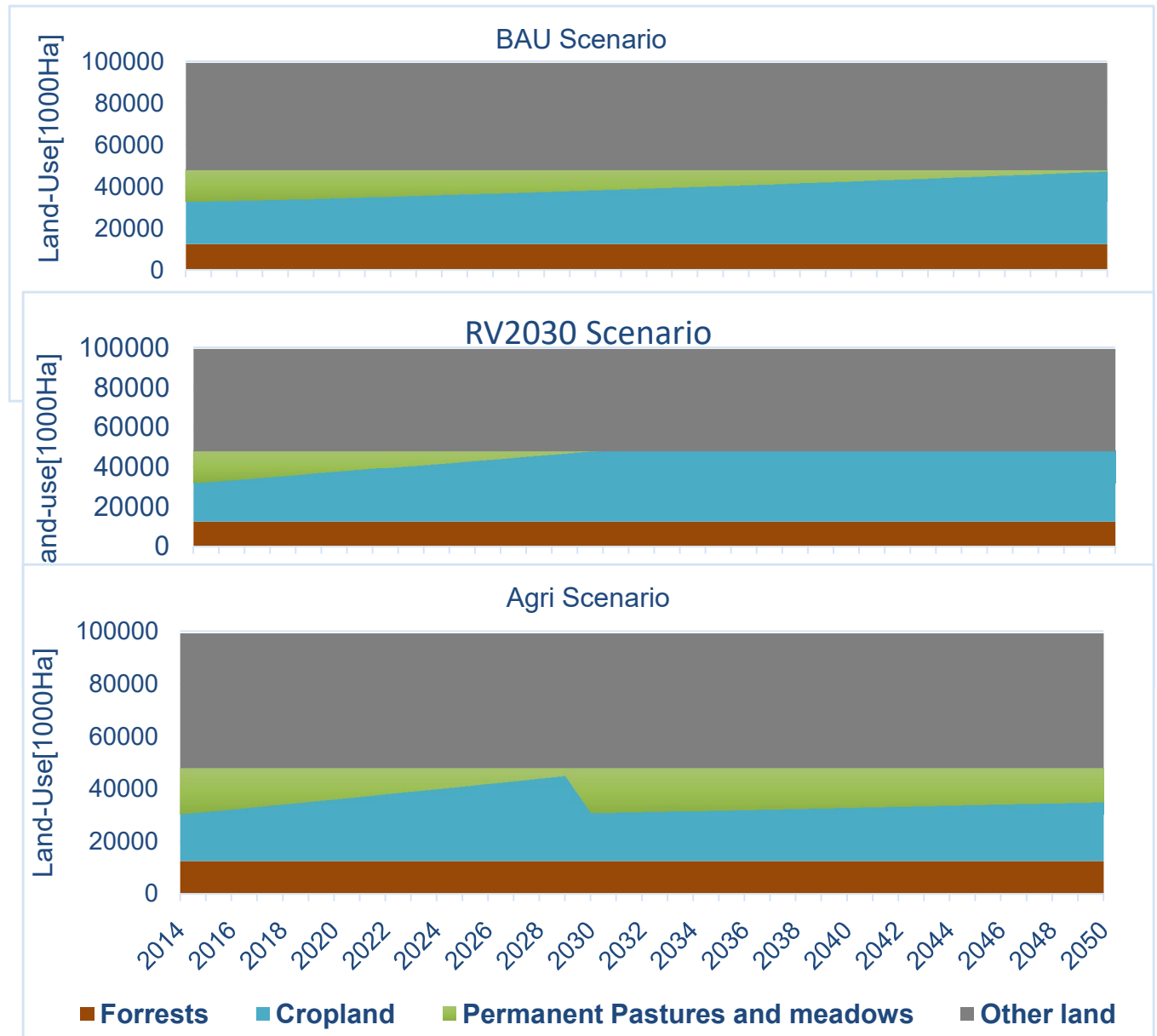
# 8.1. Key Features: Energy Export



# 8.2. Key Features: Declining Crop Land

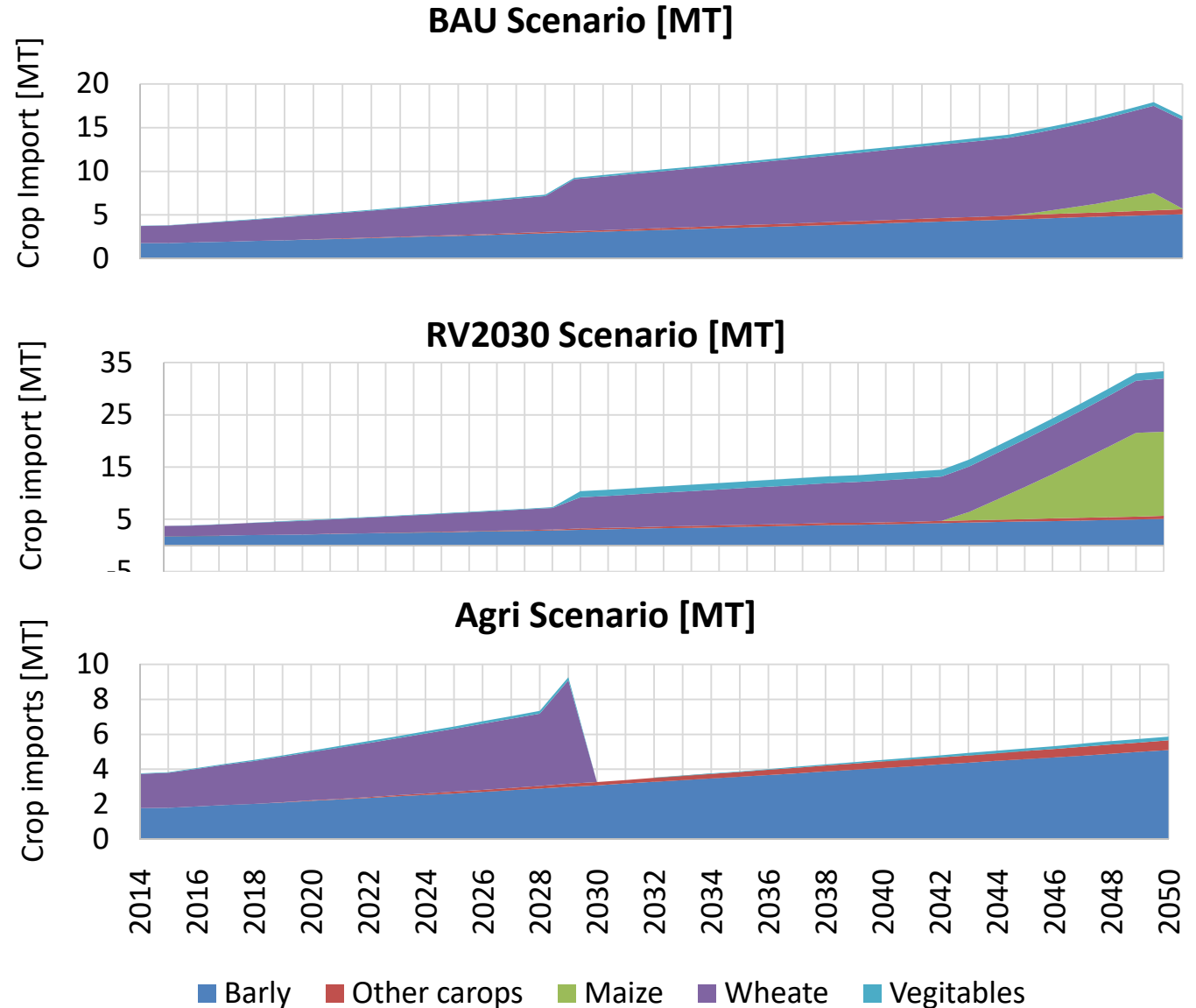
***RV2030 Scenario – will continue to induce conflict with pastoralists and forest Ecosystem***

***Agri Scenario - Doubling of agricultural productivity will guarantee food security as well as reduces burden on both the pastoral and forest resources***



# 8.2. Key Features: Crop Imports

*Both land expansion and doubling of Crop productivity doesn't eliminate crop import and guarantee food self sufficiency. Agri Scenario significantly reduces crop import from 30 MT to 6 MT by 2050.*





# 9. Summary

- *Ethiopia has adequate renewable water & energy resources to develop and satisfy the growing demand until 2050*
  - *The energy mix is dominated by hydropower and shifts to solar energy after 2040.*
  - *Energy generation requires significant capital investment*
- *Ethiopia has limited land resources for extensive agriculture development (land expansion based agriculture)*
- *Ethiopia can only satisfy its food security by 2030 & beyond changing the current mode of production and productivity*
  - *Doubling of agricultural productivity guarantee food security as well as reduces burden on both the pastoral and forest resources*
  - *Maize crop is found to be dominant economic crop to grow in Ethiopia*
  - *Continuing with Extensive agriculture will significantly conflict to the least, with pastoral and forest Ecosystems*
- *Ethiopia requires significantly Large investment to achieve WEF security.*

# 10. Policy Recommendation

## – Mobilizing A Marshal Scale Investment and Youth power

- Build Institutions and human resources capacity building
- Expand Energy Infrastructure development
- *Focus Investing in both Rainfed and Irrigation Agriculture inputs and technologies to double Agricultural Productivity*
- Implementing Nexus approach in Planning, Designing and Management of WEF to reduce costs and improve sustainability

## – Creating Enabling Environment – Peace and investment guarantee and protection

## – Enabling knowledge based private public partnership (PPP)