IRENA
International Renewable Energy Agency

REmap 2030
A Renewable Energy Roadmap

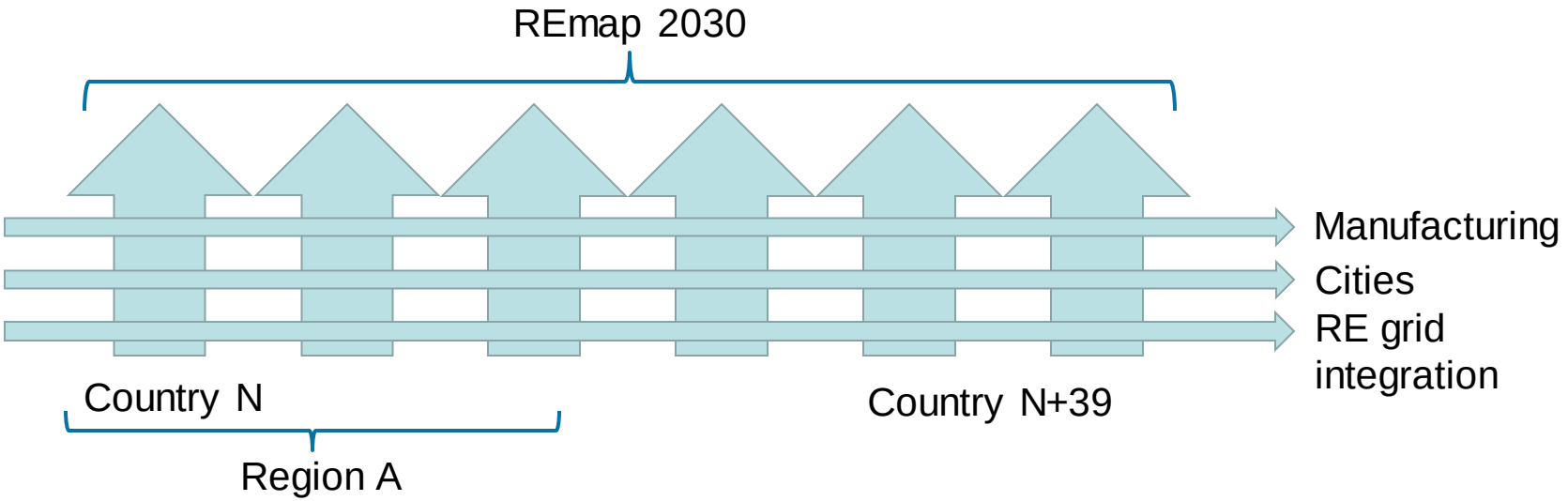
REmap 2030: Renewables for industry sector - focus on commercial solar thermal -

ISES Webinar, 23 June, 2015

1 REmap 2030

REmap 2030 - A roadmap for doubling the RE share

- REmap explores the potential, cost and benefits of doubling the renewables share in the global energy mix
- From RE objective of SE4All, for which IRENA is hub
- Technology options, emphasis on end-use incl. heat
- Coverage: 40 countries; 80% of the global energy use
- Developed together with & validated by country experts



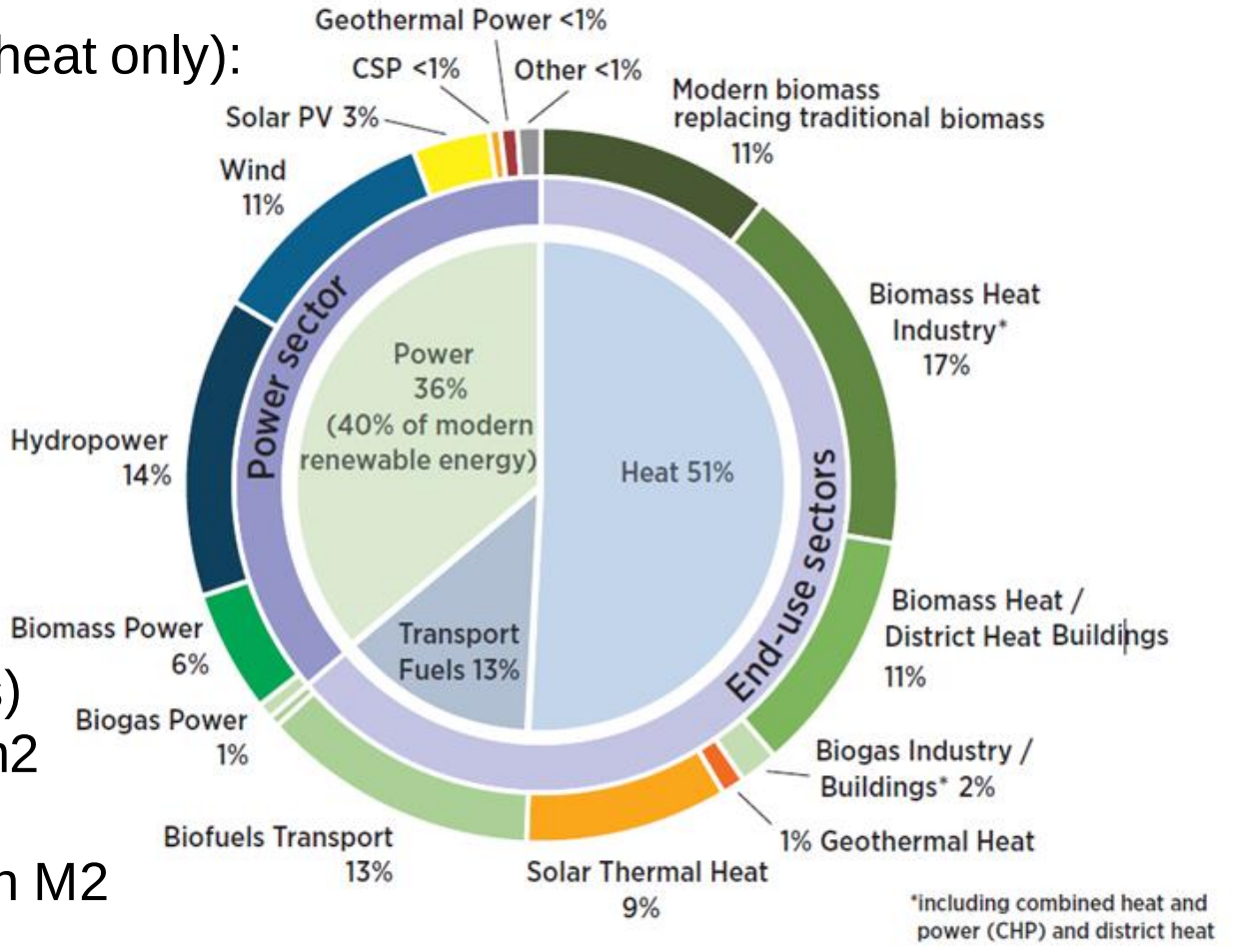
Global RE Use in 2030 including REmap Options

REmap 2030 – 132 EJ (final energy)

60% of total is biomass; and 20% is industry (18% biomass & 2% solar thermal)

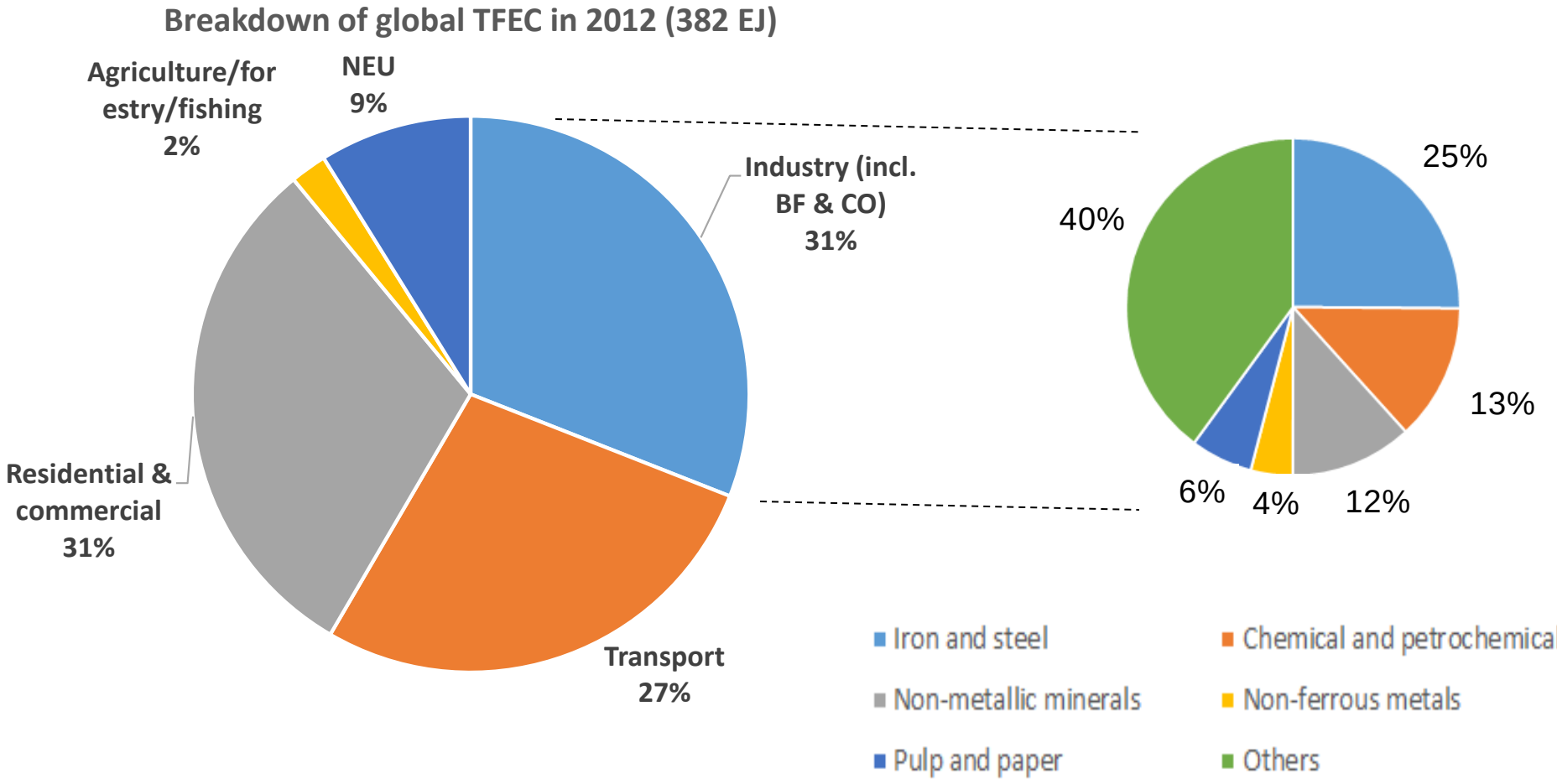
Industry sector RE share (heat only):
-2010: 8% (biomass)
-2030 BAU: 9-10%
-REmap 2030: 20%

Collector Area
-2012: 450 million m2
(<1% industry applications)
-2030 BAU: 1500 million m2
(3% industry)
-REmap 2030: 4000 million M2
(30% industry)



2 Renewables in Manufacturing

Manufacturing sector energy



TFEC: Total Final Energy Consumption

Methodology

1) **Projections of industrial energy use: 2010 – 2030**
2) **Production costs of process heat generation: 2030**
3) **Potentials of renewables**

1) Technical potentials, capital stock and temperature level,

→ two scenarios: **Optimistic** and **Realistic**

└ **2) Economic potentials,** comparison of process heat generation costs,

→ two scenarios: **Moderate climate policy** and **Ambitious climate policy**

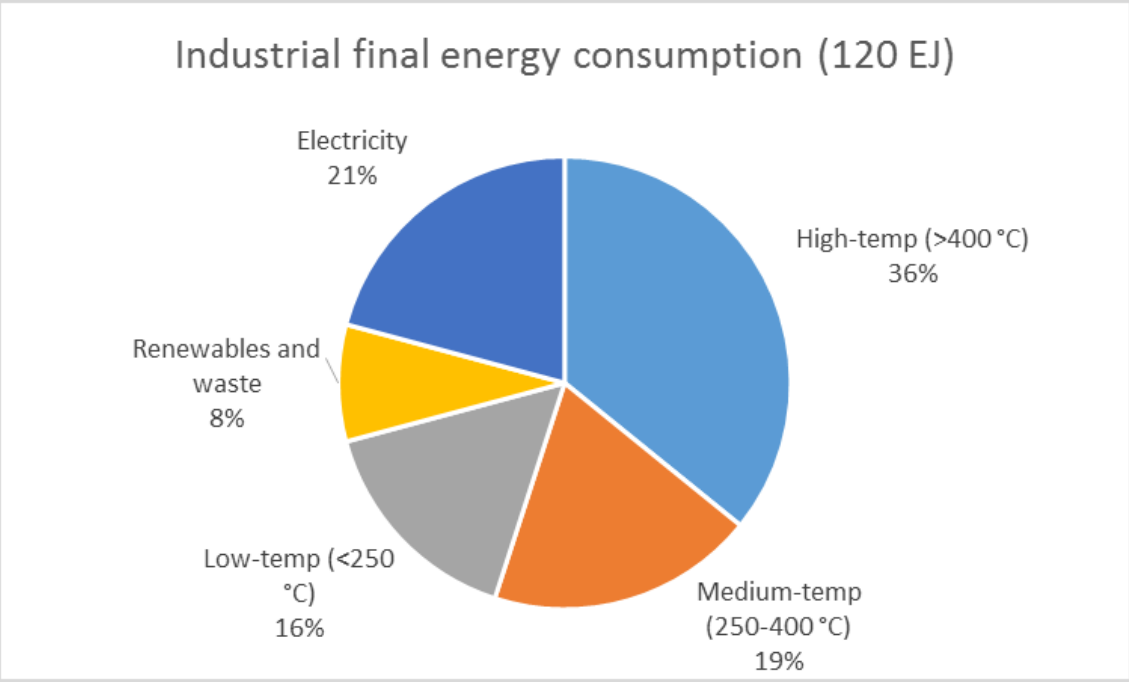
└ **3) Economically realisable potentials,** comparison of economic potentials with resource supply (notably for biomass)

└ **4) Allocation of realisable potentials** to different temperature levels

Key findings Growth and costs

Industrial energy use growth

- Total final industrial energy use grows to about 120 EJ by 2030 (excl. NEU)
- 85 EJ **fossil fuels**, 10 EJ combustible renewables and waste, 25 EJ electricity
- Solar thermal is foreseen to cover a share of up to 13% of the 19 EJ total low-temp process heat demand



Key findings Growth and costs

Process heat generation costs in 2030

- Fossil fuels: average 55-70 USD/MWh_{th}
  - But varies across countries: 35-110 USD/MWh_{th}, depending on temperature, energy price, fuel type, technology

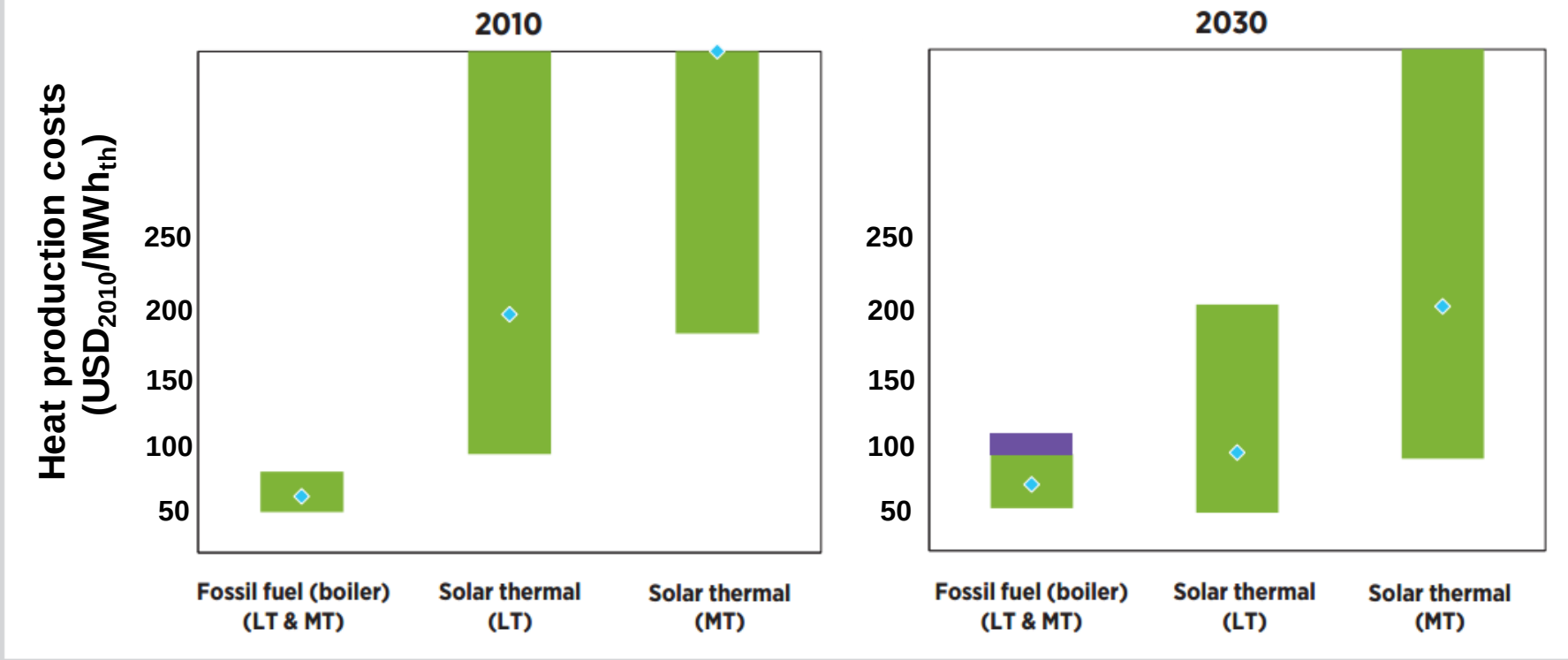
- Carbon pricing adds another 10-30 USD/MWh_{th}

- **Solar thermal cost-competitive in some regions with 55-125 USD/MWh_{th} India, LAC, parts of OECD**

- Biomass residues **cost-competitive** worldwide 30-55 USD/GJ_{th}, energy crops **only in few regions** 70-125 USD/MWh_{th}

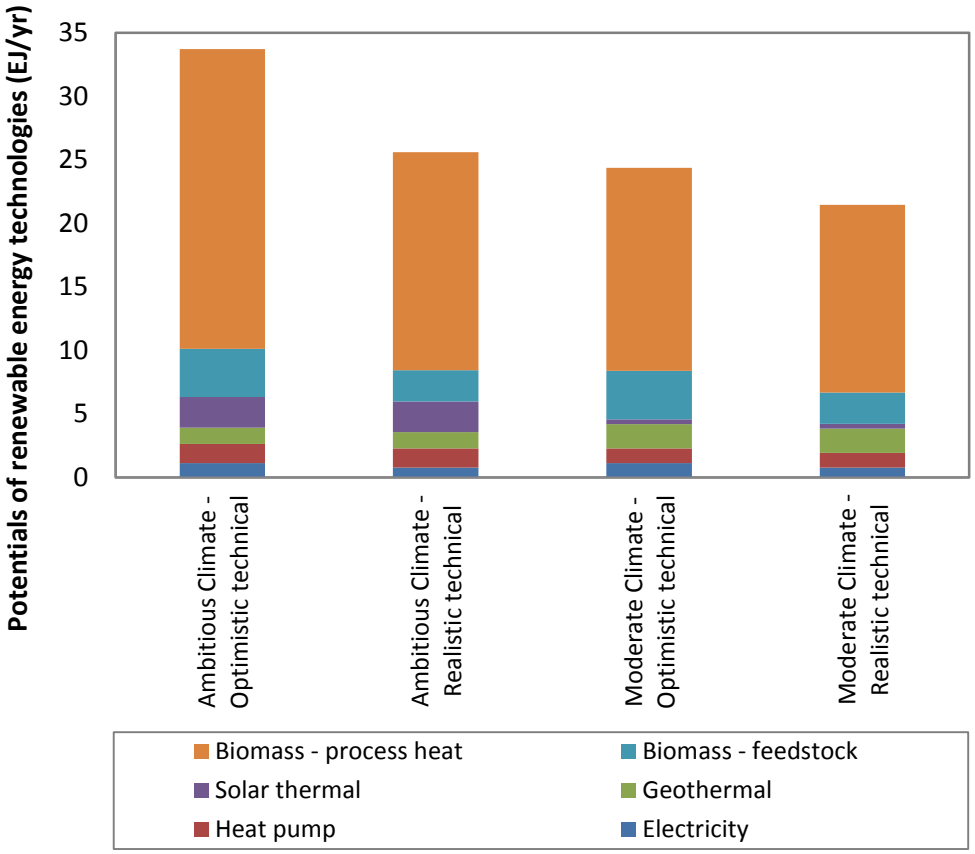
- Geothermal and heat pumps **cost-competitive** 35-90 USD/MWh_{th} in most regions

Key findings Cost-competitiveness



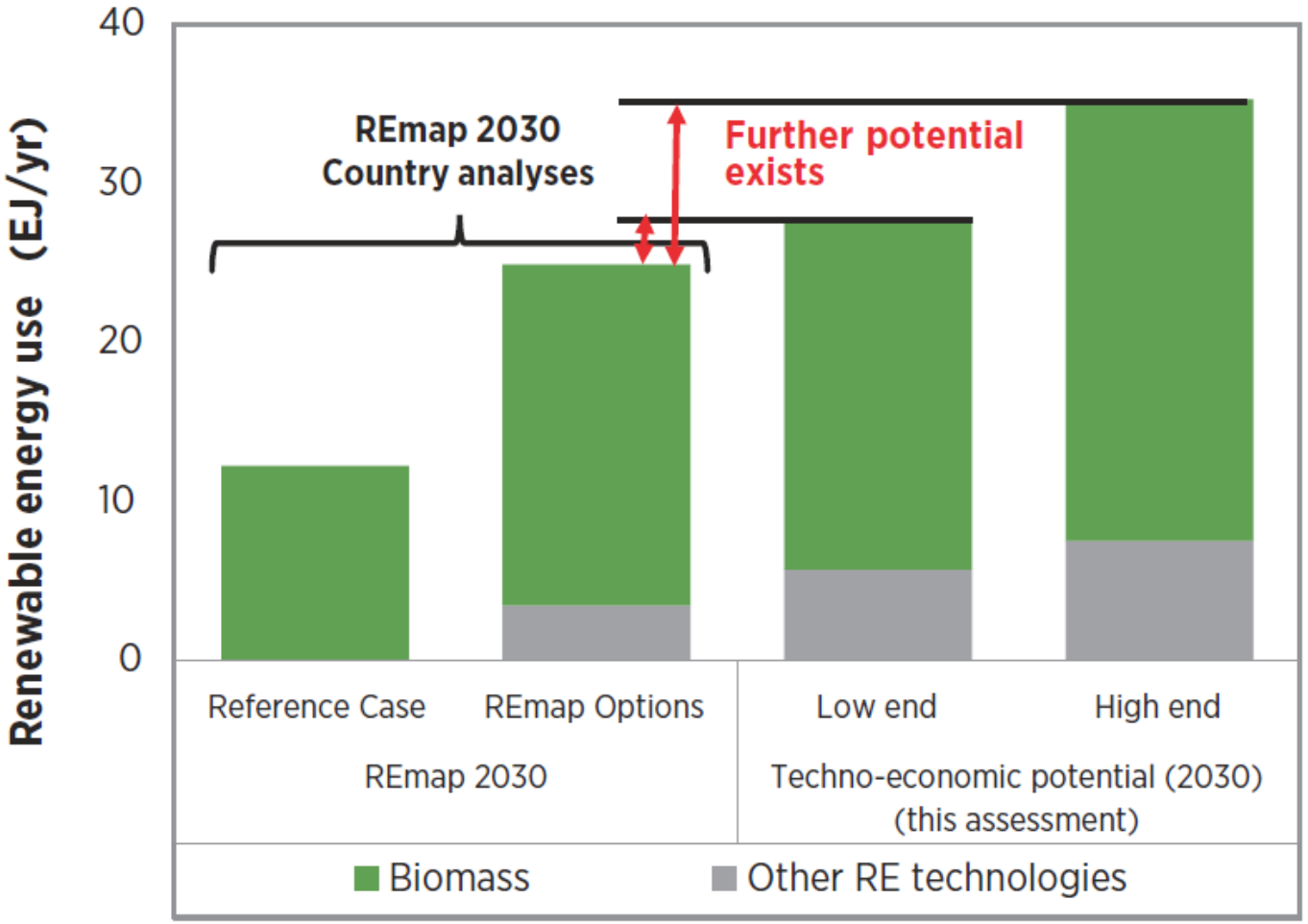
Where: The green bars show that range of costs across the different regions, and the purple bar show the additional costs from a price on CO_2. The solid blue dot shows the weighted average of the world. LT: low-temperature; MT: medium-temperature.

Key findings Scenarios



- Additional potentials of RE range from **21 EJ** to as high as **33 EJ** for the global industry by 2030,
- Low-cost biomass basis for process heat generation: **15-24 EJ** (both existing & new capacity)
- Solar thermal for LT heat contributes **0.4-2.4 EJ** (new cap.)
- Geothermal and heat pumps for LT heat **3 EJ** (new capacity)
- Biomass as feedstock **>4 EJ**

Key findings Techno-economic potentials



Solar thermal makes up approximately 45% of “other RE” potential

RE Deployment considerations

Limiting factors for Solar Thermal

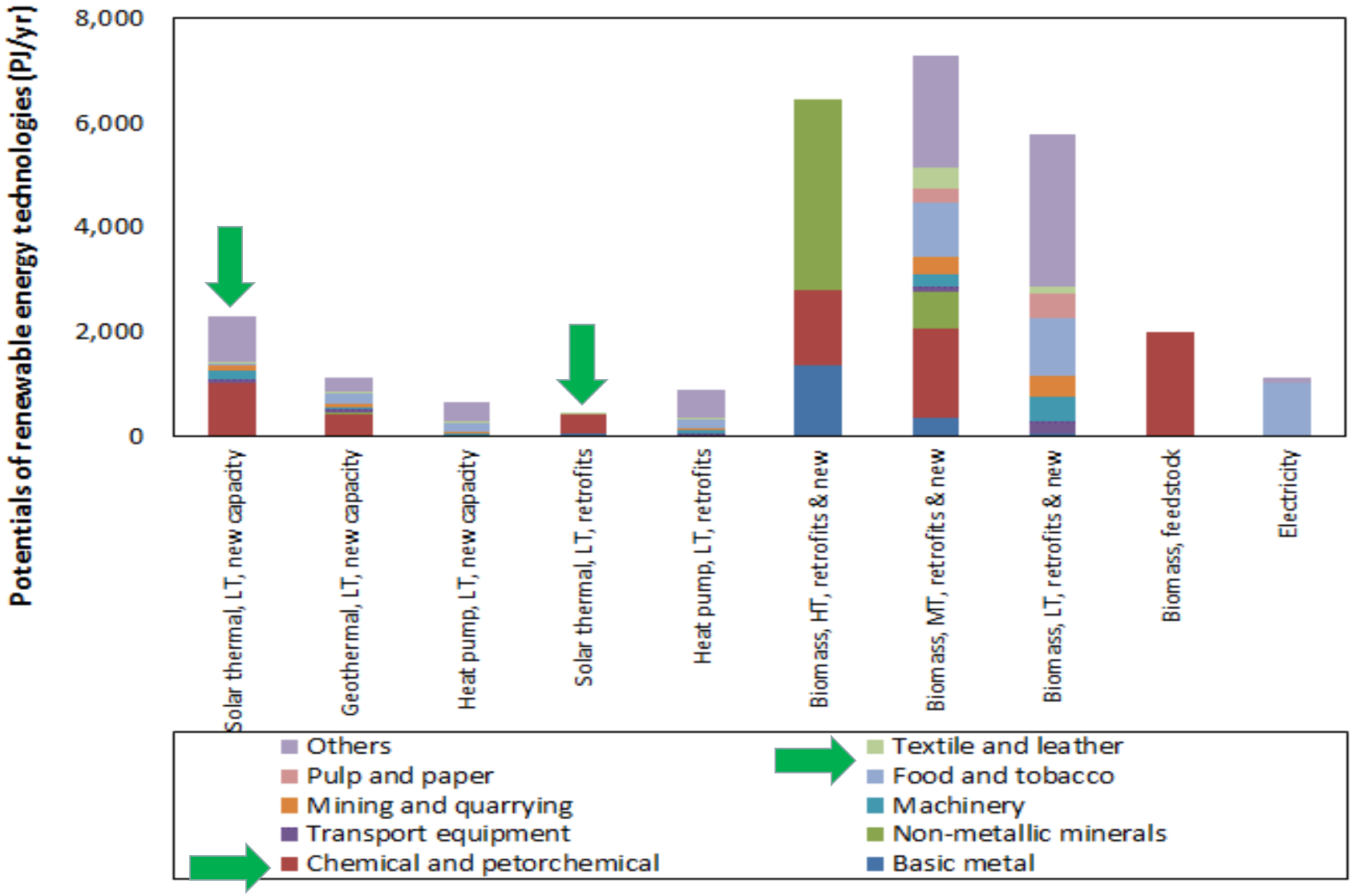
- Current concentrating ST technologies are limited to 250C steam
- Space limitation for ST systems in existing plants therefore potential in new manufacturing plants ’
  - New manufacturing plants will be mainly built up in Asia in the coming years
- Large technical and economic potential in small-scale plants and less energy-intensive industries like textile and food
- High price of solar thermal – high capital cost with high WACC in many markets

Bioenergy

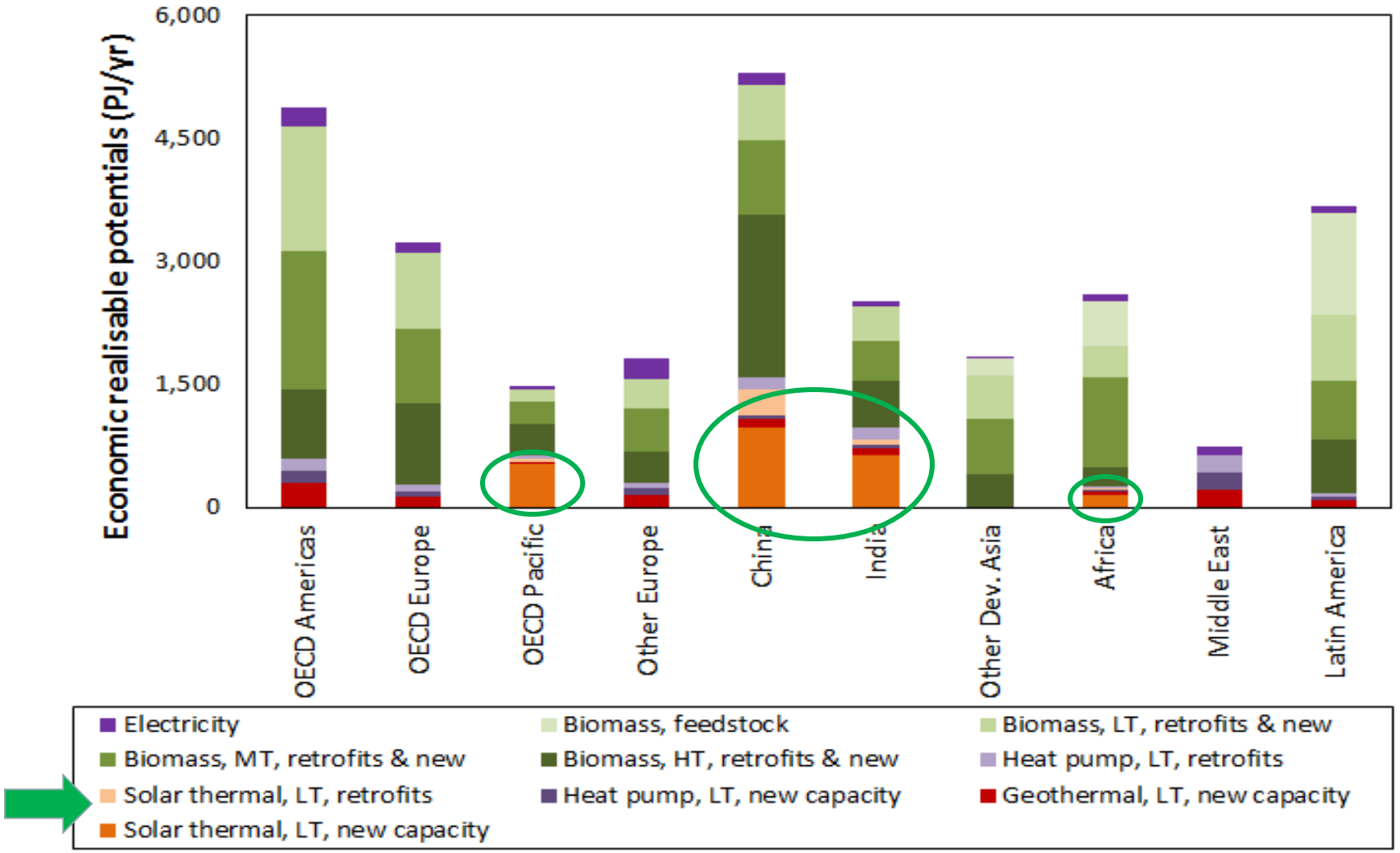
- Logistical/storage limitations to use biomass
- Biomass prices/availability potentially a major barrier

→ So it’s not only an issue of carbon pricing/competitiveness

Key findings By technology



Key findings By region



Solar thermal tech brief

Process and Technology Status

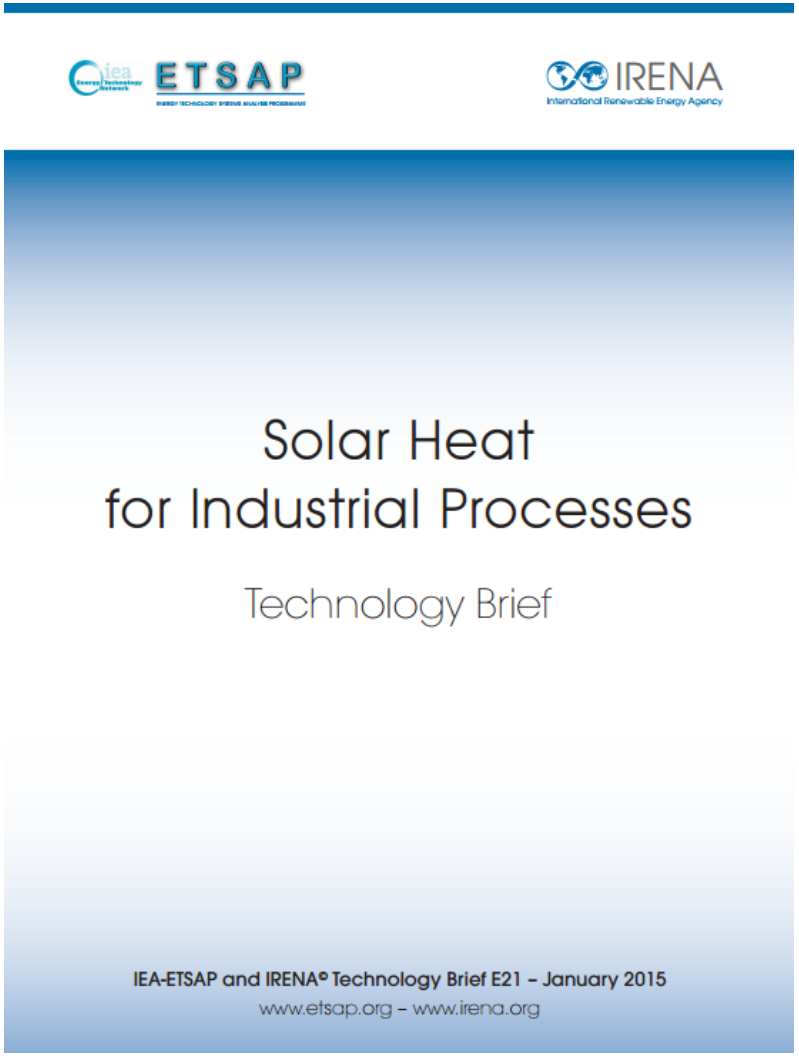
- Solar air heating
- Solar heat collectors
  - LT <150 C
  - MT 150C-400C
- Solar cooling

Market potential

Industry segments

Performance and Costs

Potentials and Barriers



Study on Developing Quality Infrastructure for solar water heaters

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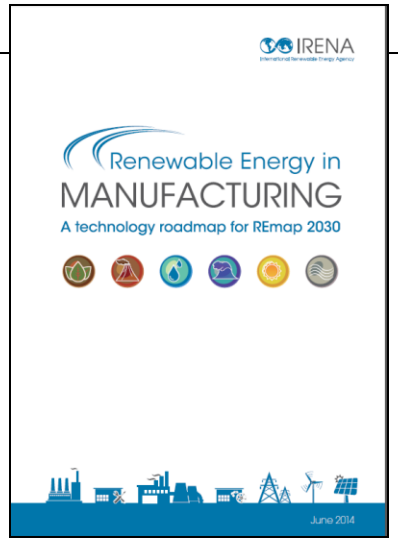

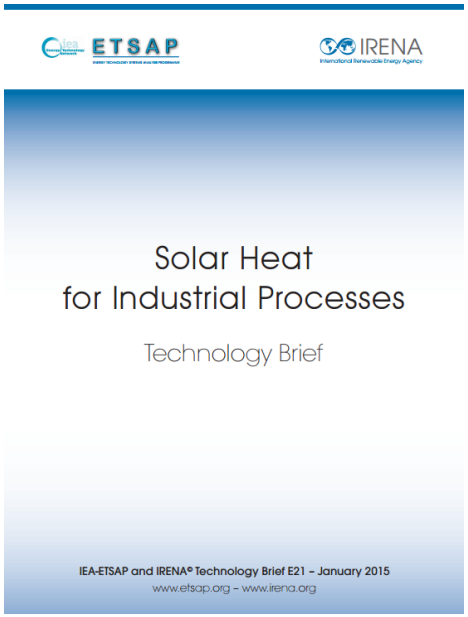

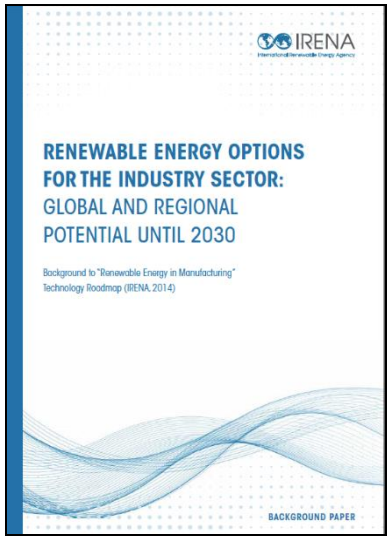

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THANK YOU

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