



# Expert Group Meeting on Mainstreaming Climate Action into National Development Planning in the Arab Region

Amman, 25-27 November 2019

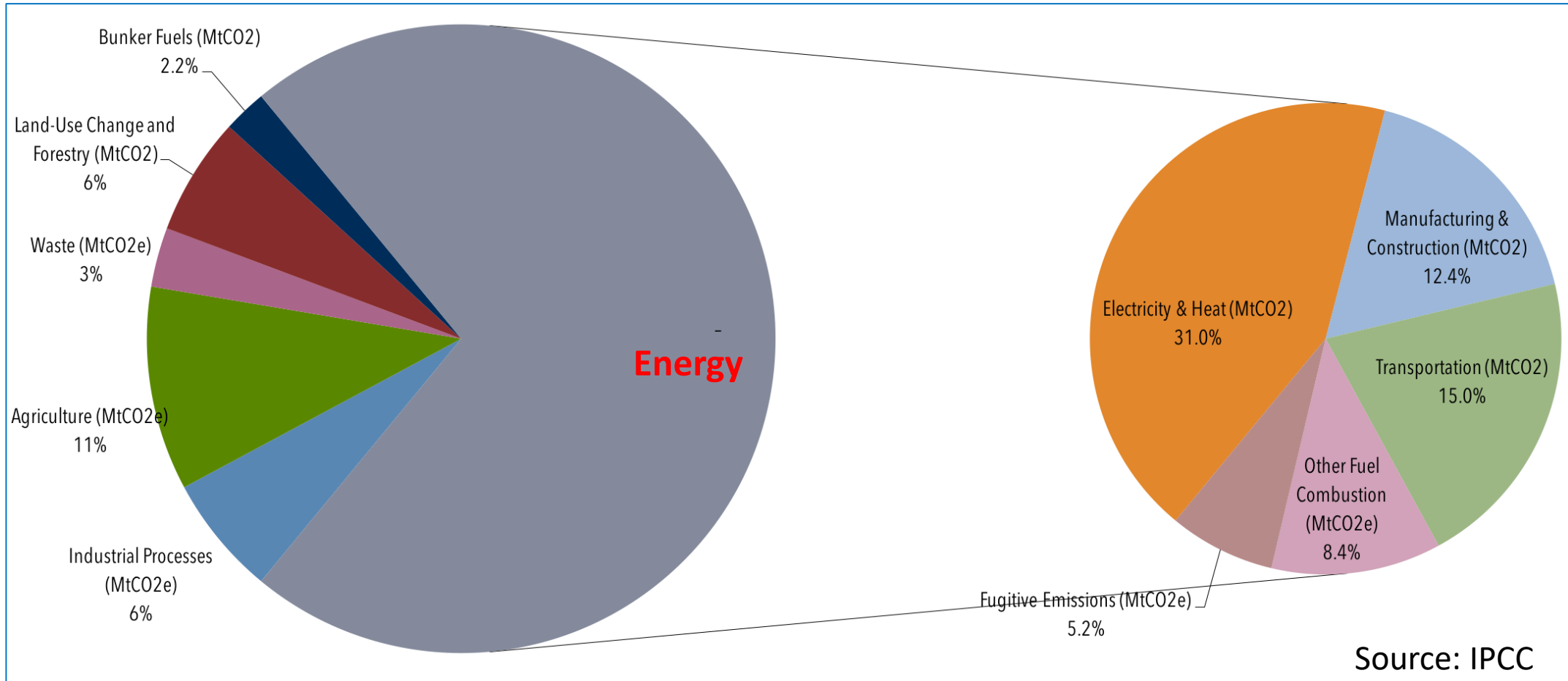
## Assessing Financial and Technological Needs for Sustainable Energy Transitions

Rafik Missaoui, ALCOR Consult, Tunisia

# Content

- **Why energy transition is needed ?**
- **World Energy sector decarbonization scenario**
- **Technology needs : Key energy sector decarbonization drives**
- **Investment needs for energy transition**
- **Financing of energy transition**

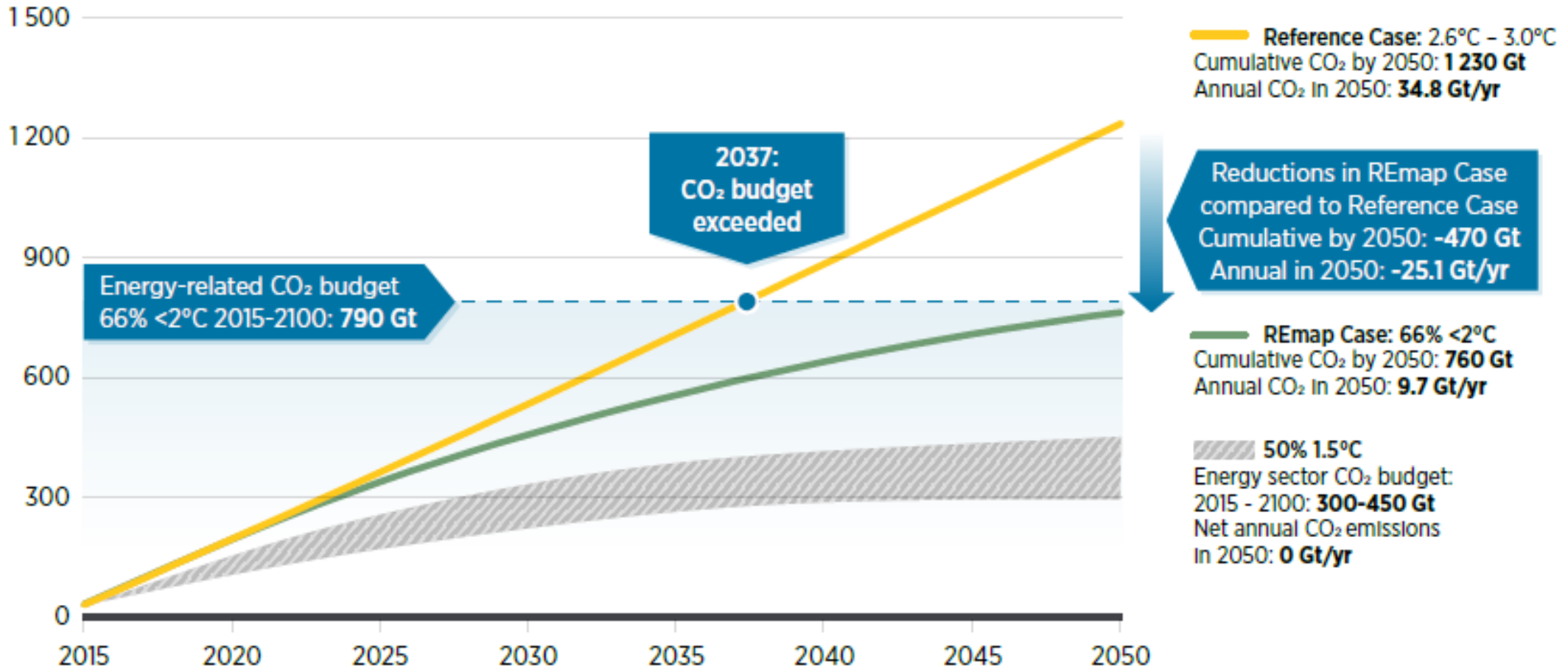
# Why energy transition is needed ?



**Energy is the main source of GHG emission in the world**

# Why energy transition is needed ?

Cumulative energy-related carbon emissions (Gt CO<sub>2</sub>)



Source: IRENA, 2018

**No way to reach 2°C path without deep Energy decarbonization**

## Why energy transition is needed ?

- Energy security
- Commercial balance
- Energy subsidy reduction
- Economic growth engine

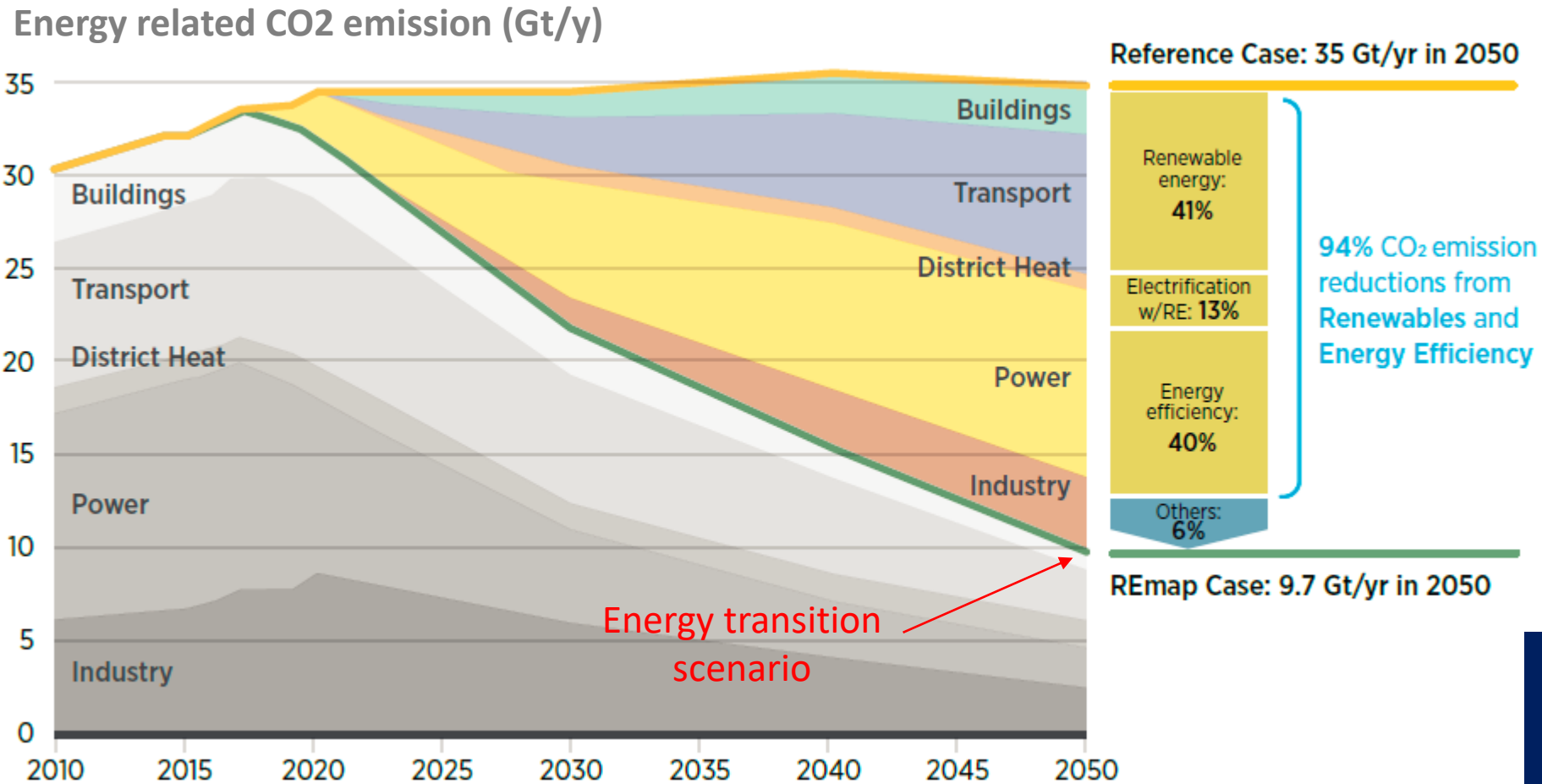
**Need for Energy sector decarbonization to meet 2°C scenario of Paris Agreement**

- Energy poverty fighting
- Energy access
- Job creation

**Energy Transition lead to win-win situation for both:**

- Energy net importing countries
- Energy net producer countries

# World Energy sector decarbonization scenario

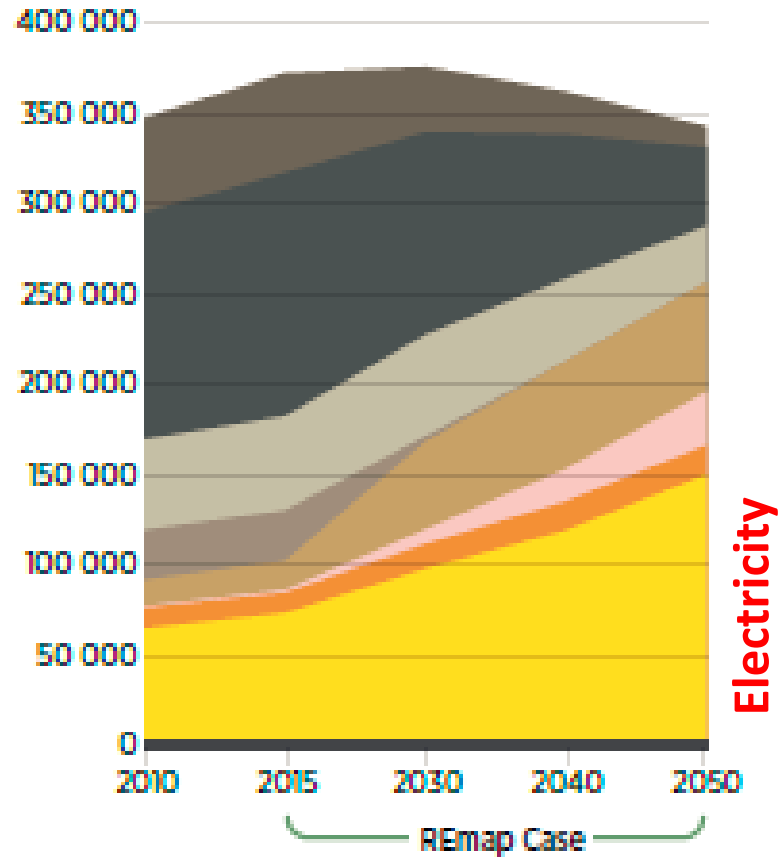


Source: IRENA, 2018

**Major role of EE and RE in the energy sector decarbonization scenario**

# World Energy sector decarbonization scenario

Total final energy consumption (PJ/yr)



Coal Traditional biomass District heat  
Oil Modern biomass Electricity  
Gas Other renewables\*

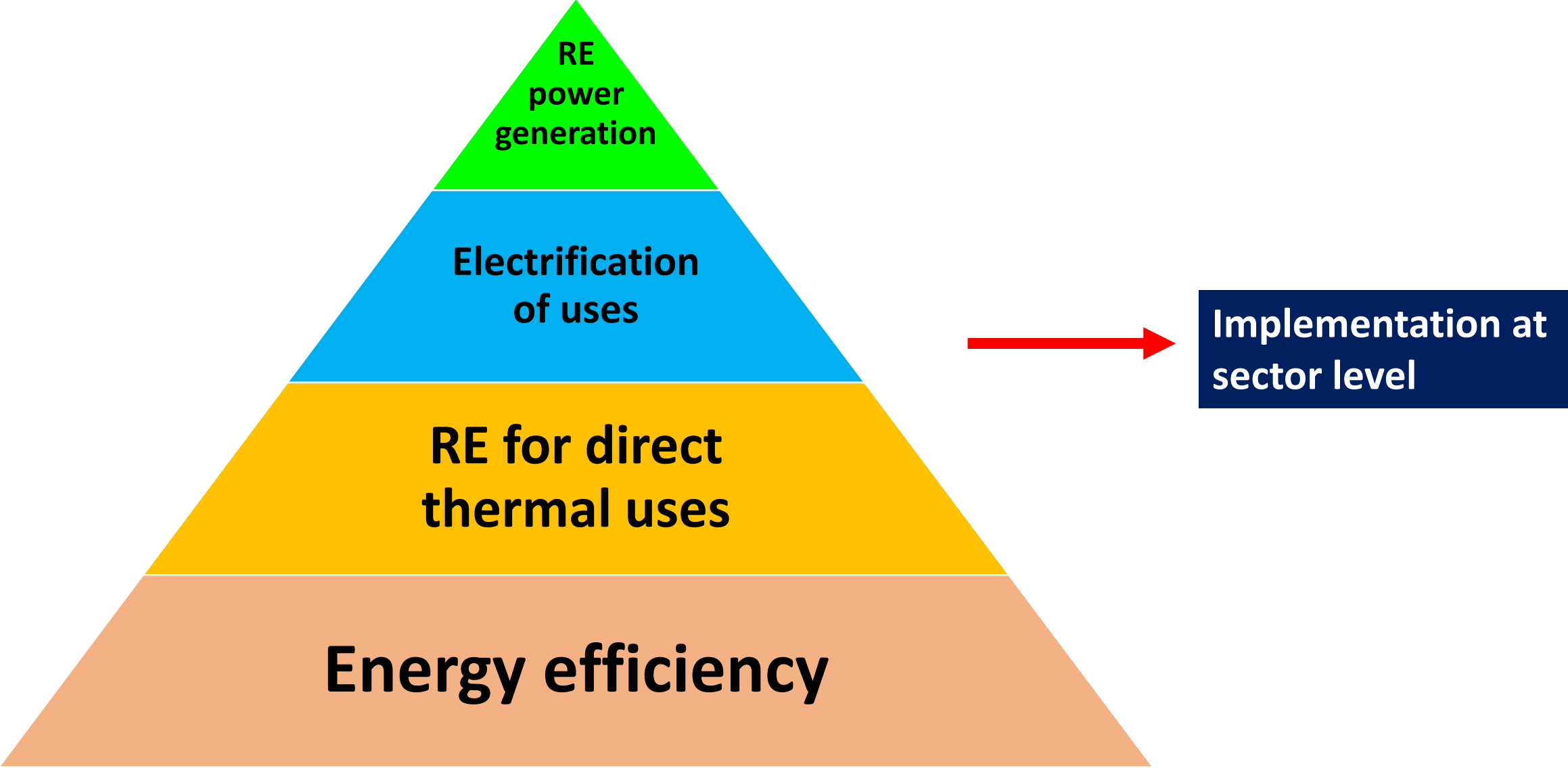
Source: IRENA, 2018

Share of electricity in final energy consumption will reach around 50% by 2050 compared to 20% currently



Large electrification process of final uses in all sectors

# Technology needs : Key energy sector decarbonization drives





## Technology needs : Key energy sector decarbonization drives

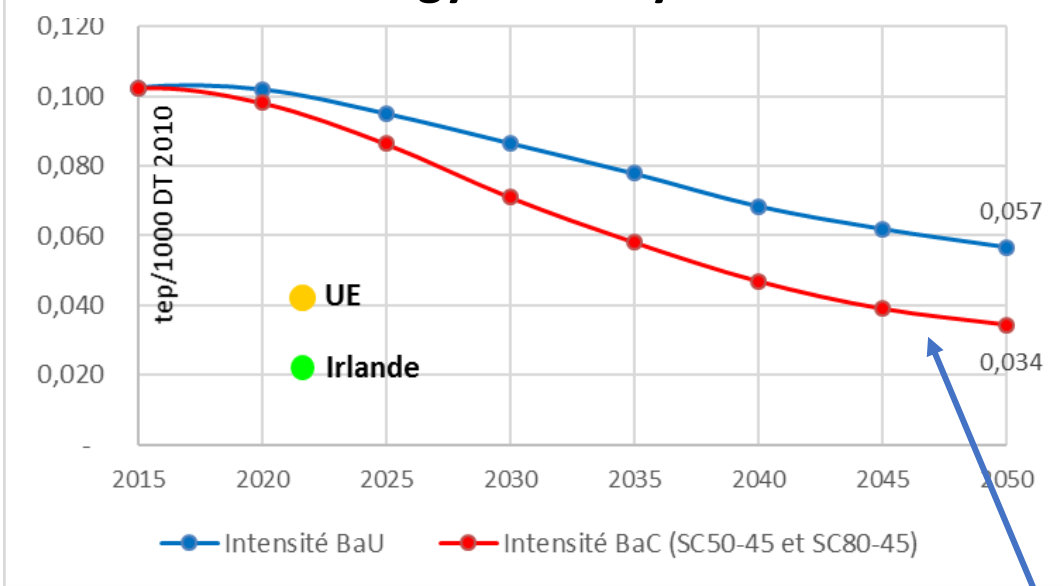
Sectors	Main drives energy decarbonisation in economic sectors
<b>Transport</b>	<ul style="list-style-type: none"><li>• Modal change: rail way, collective transport, soft transport, etc.)</li><li>• EE in cars and all transport means</li><li>• Massive introduction of electrical vehicles</li><li>• Electrification of rail ways</li></ul>
<b>Industry</b>	<ul style="list-style-type: none"><li>• Energy efficiency in process</li><li>• Efficiency of utilities (motors, compressed air, heat, cold..)</li><li>• Thermal use of RE (Solar and biomass)</li><li>• Electrification of uses</li></ul>
<b>Buildings</b>	<ul style="list-style-type: none"><li>• Energy efficiency of envelop and appliances</li><li>• Solar thermal and biomass for heat (when available)</li><li>• Electrification of residential use (heat pumps, etc.)</li></ul>
<b>Agriculture</b>	<ul style="list-style-type: none"><li>• Efficiency improvement of agriculture machineries</li><li>• Solar thermal use</li><li>• Electrification of water pumping</li></ul>
<b>Power sector</b>	<ul style="list-style-type: none"><li>• Losses reduction</li><li>• Power generation specific consumption improve</li><li>• Massive RE integration in the Power System</li></ul>

### Large needs for:

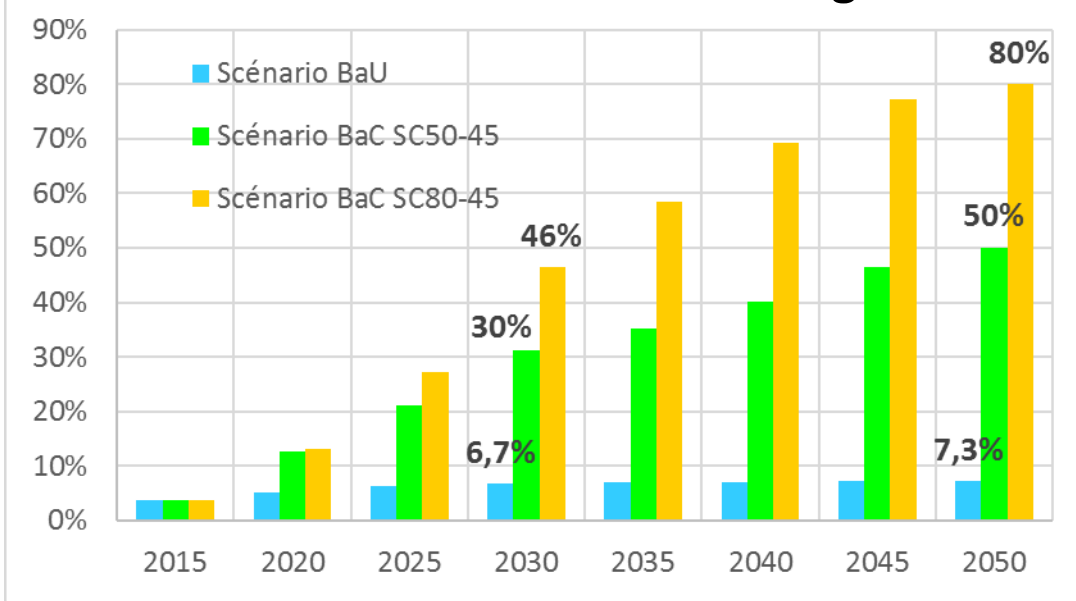
- Expertise and technology transfer
- Capacity building
- Sectors' reform
- Investments

# Technology needs : Key energy sector decarbonization drives (case of Tunisia)

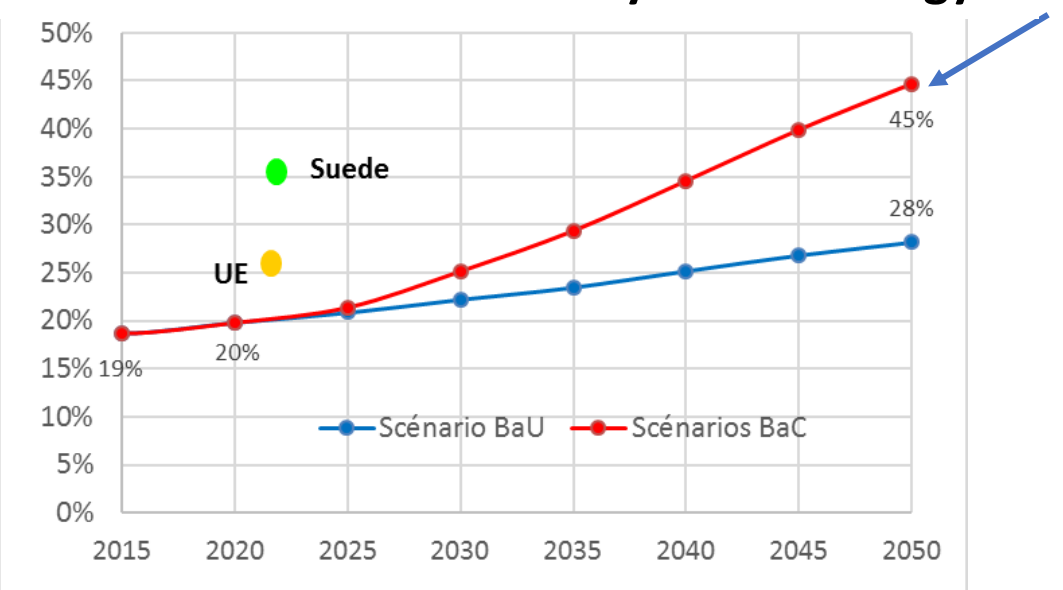
## Final energy intensity scenarios



## Scenarios of share of RE in Power generation



## Scenarios of % of electricity in final energy



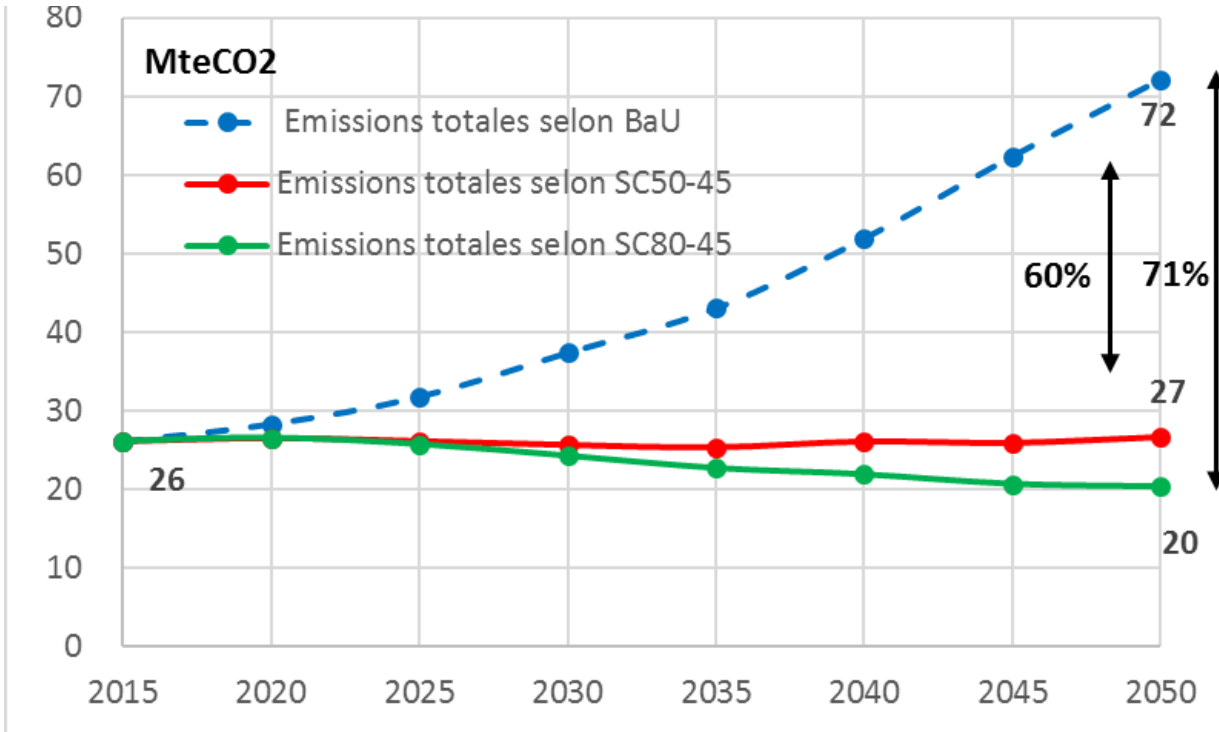
Low carbon scenario

**By 2050:**

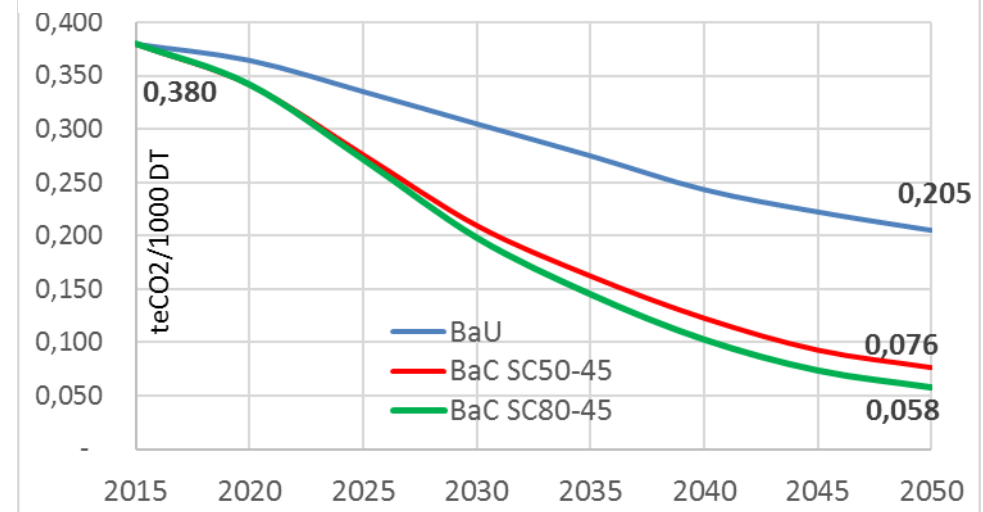
- Final energy intensity: **Divided by 3 compared to 2015**
- Share of electricity in final consumption : **45%**
- Share of RE in electricity generation : **80%**

# Technology needs : Key energy sector decarbonization drives (case of Tunisia)

## Total CO2 emission of energy sector by scenario

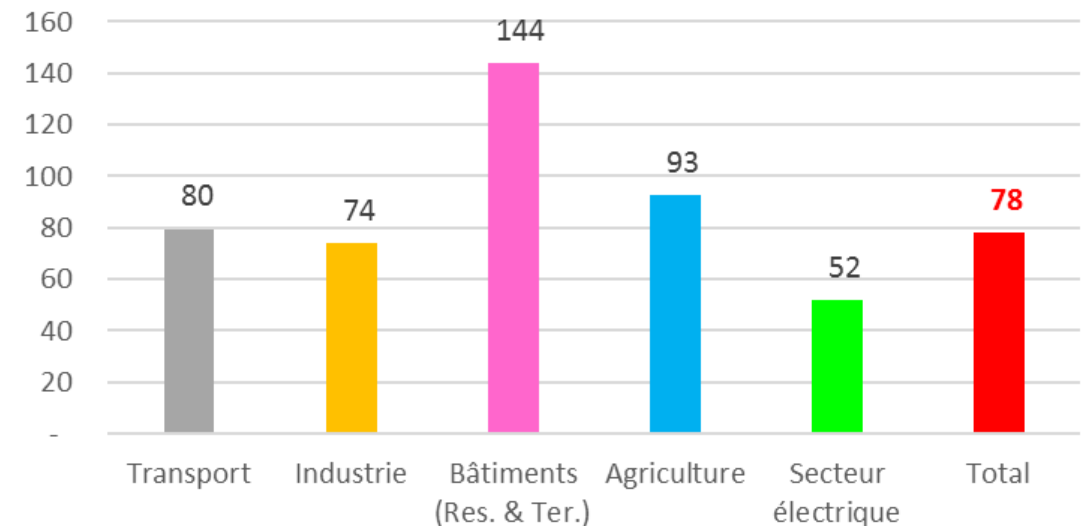


## Carbon intensity by scenario



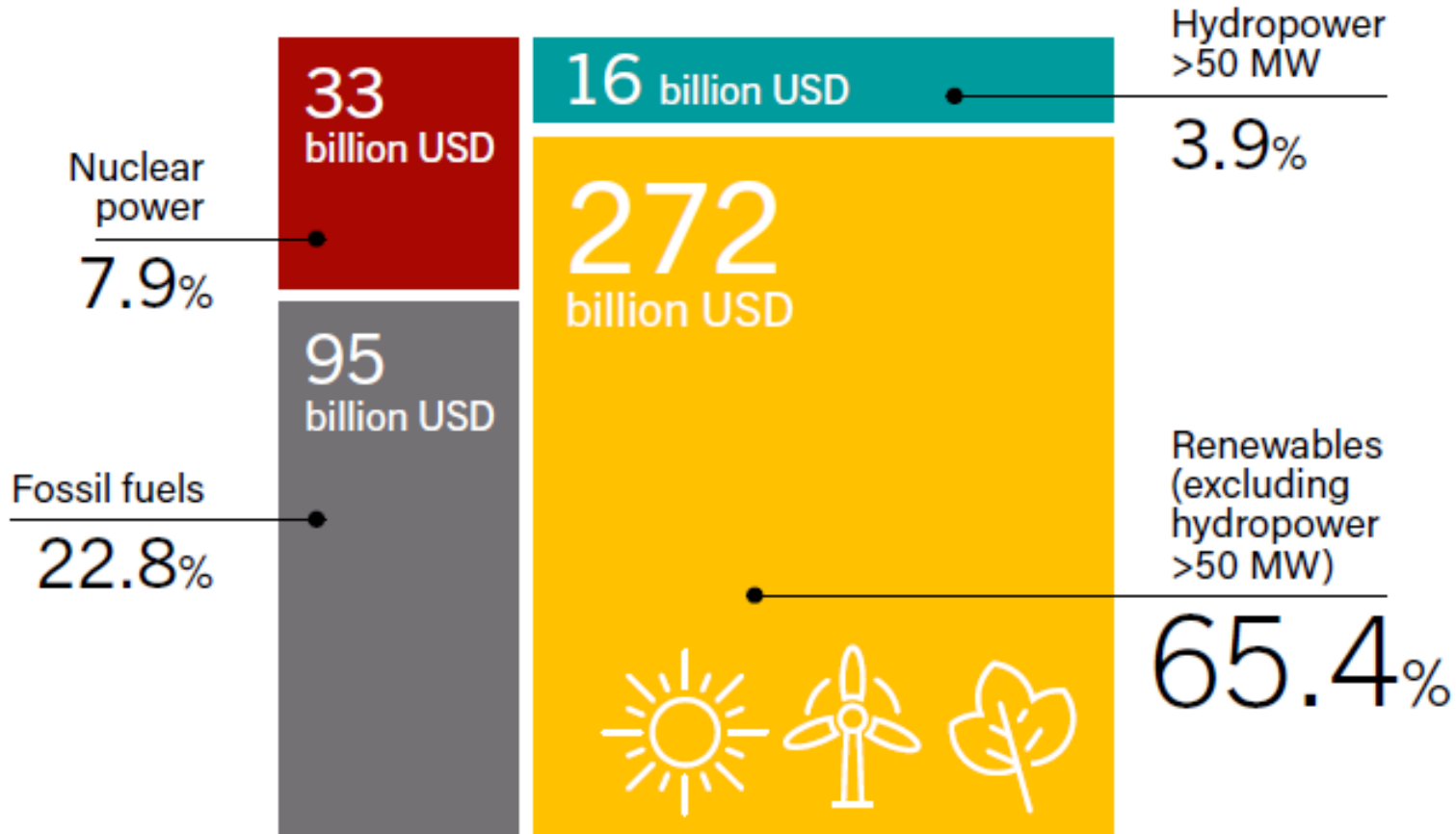
**80% of RE in power generation will lead to lower energy sector emission by 22% in 2050 compared to 2015**

## Sectors emissions compared to 2015 : 80% RE Scenario



# Investment needs for energy transition

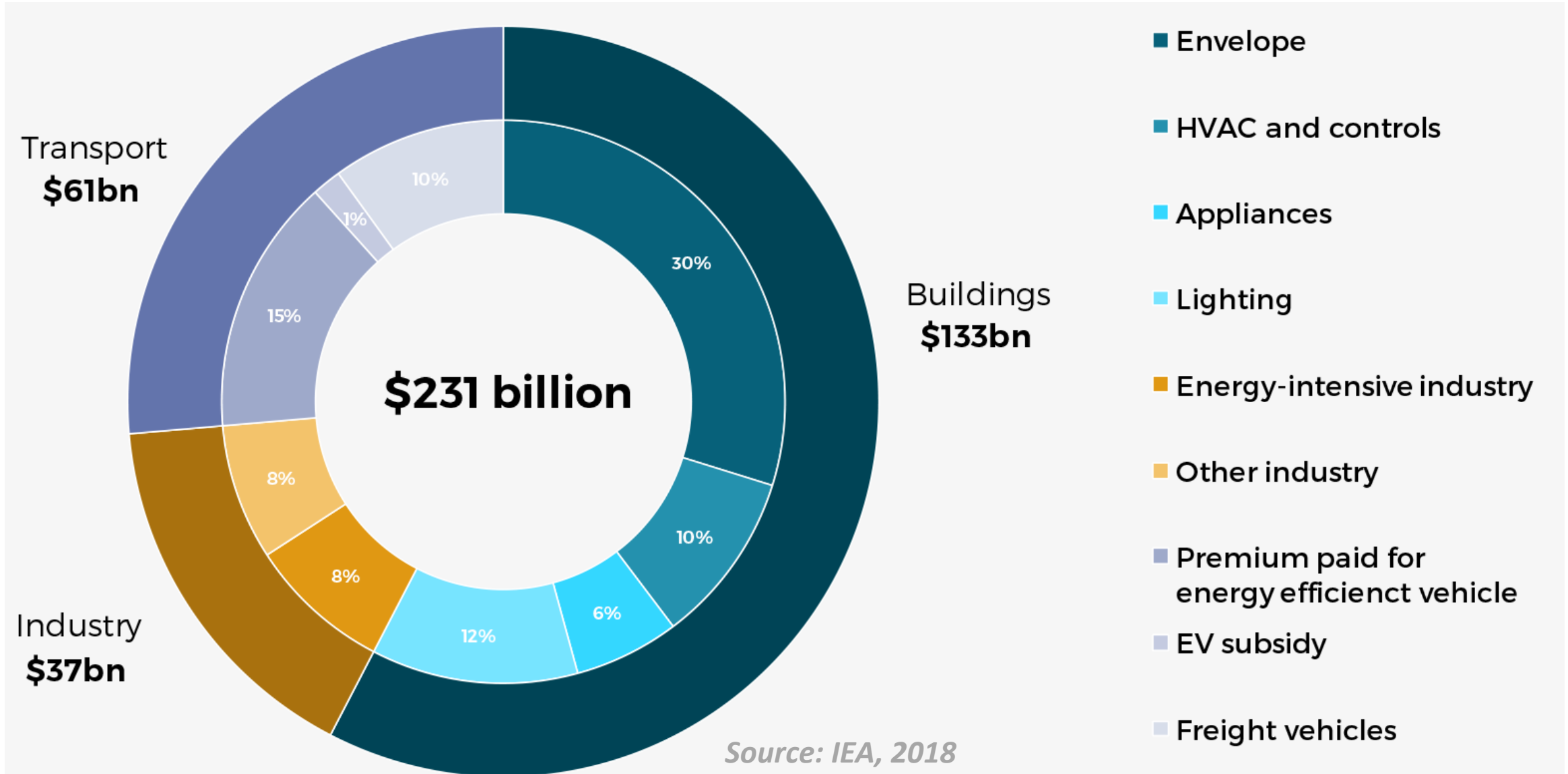
## Global Investment in renewables in 2017



In 2018 investment in RE in the world exceeded 3 times those in fossil fuel power plants : **The changes already started**

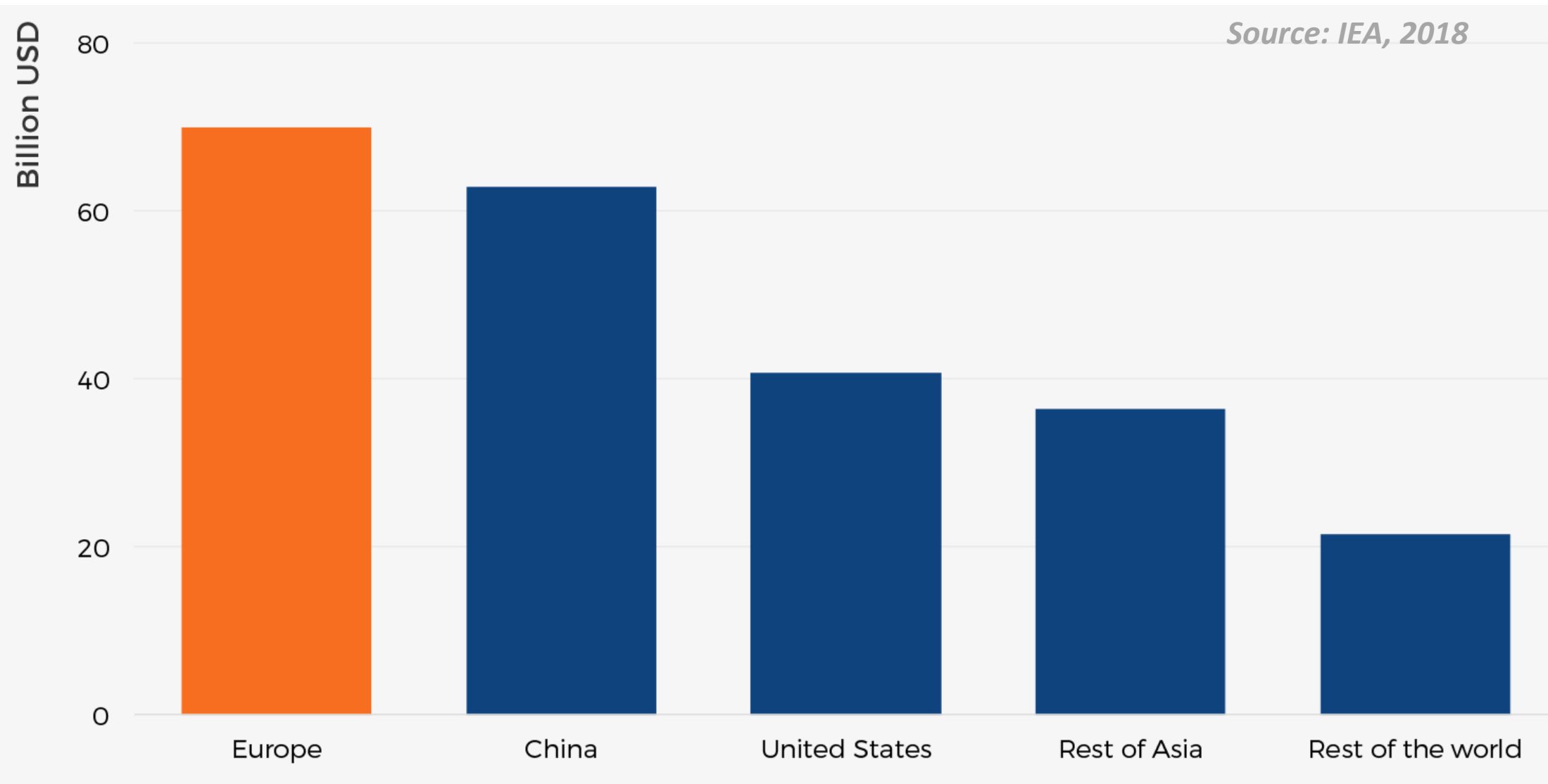
# Investment needs for energy transition

## Global Investment in energy efficiency in 2016



# Investment needs for energy transition

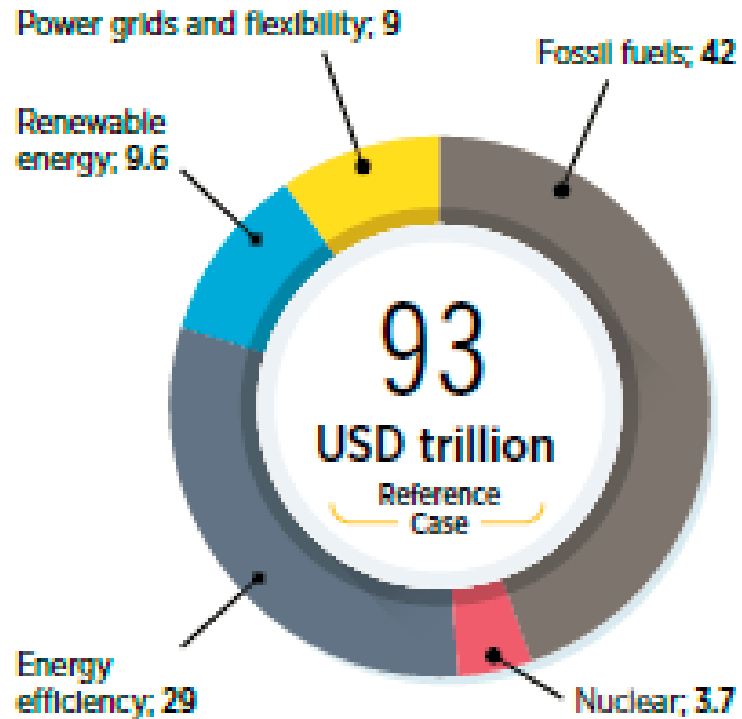
## Global Investment in energy efficiency by region in 2016



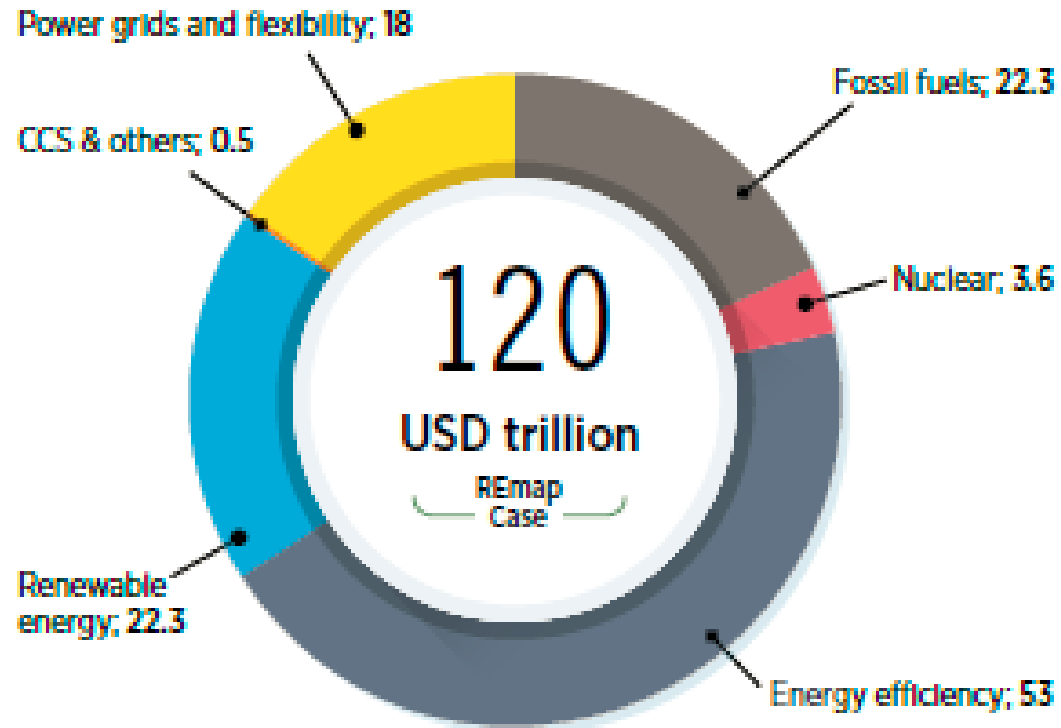
# Investment needs for energy transition

## Cumulative investment 2015-2050 (USD trillion) - Reference and REmap scenario (IRENA)

Reference Case energy sector Investments between 2015-50 (USD trillion)



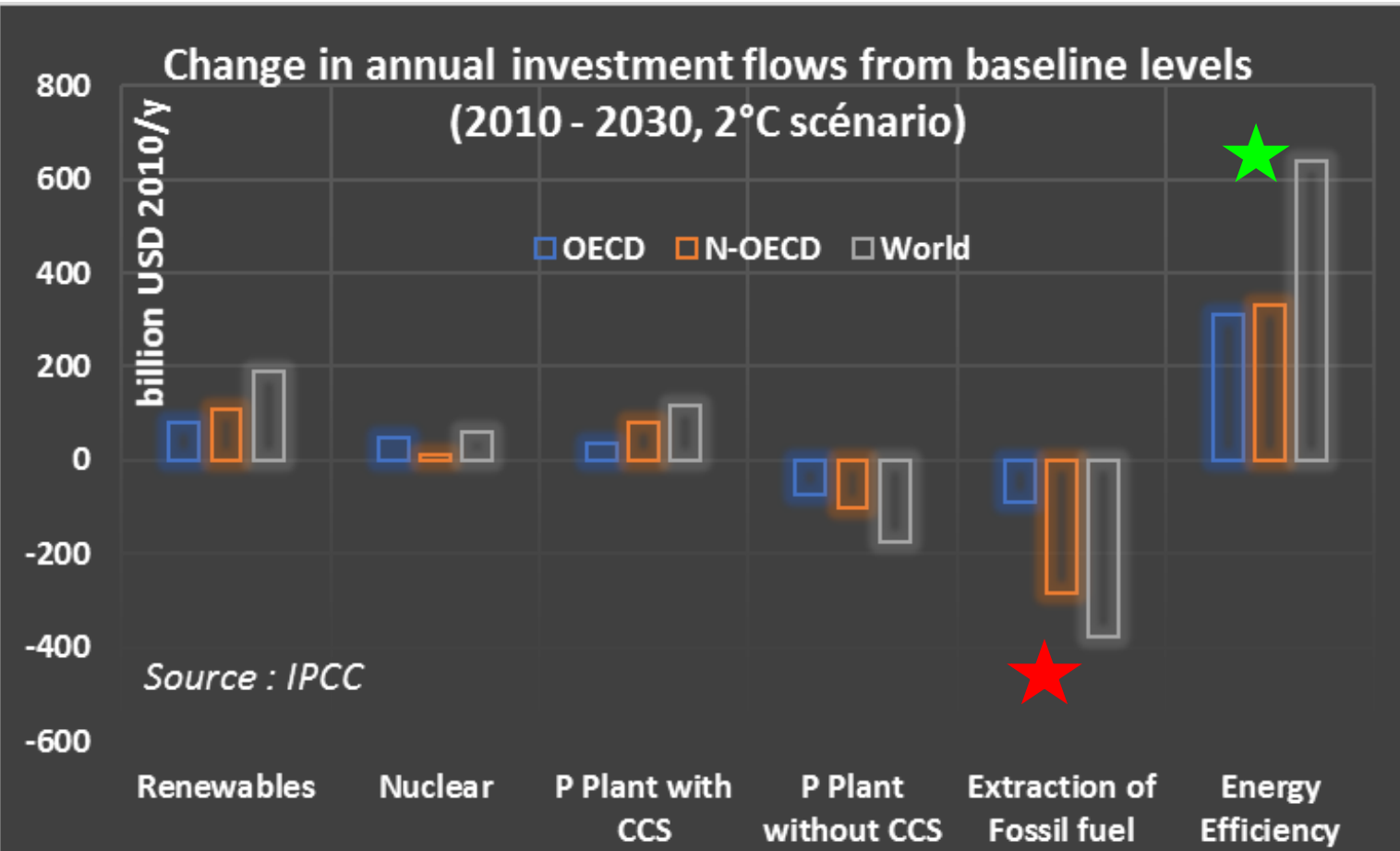
REmap Case energy sector Investments between 2015-50 (USD trillion)



Source : IRENA

# Investment needs for energy transition

## Investment needs for 2°C scenario (IPCC)



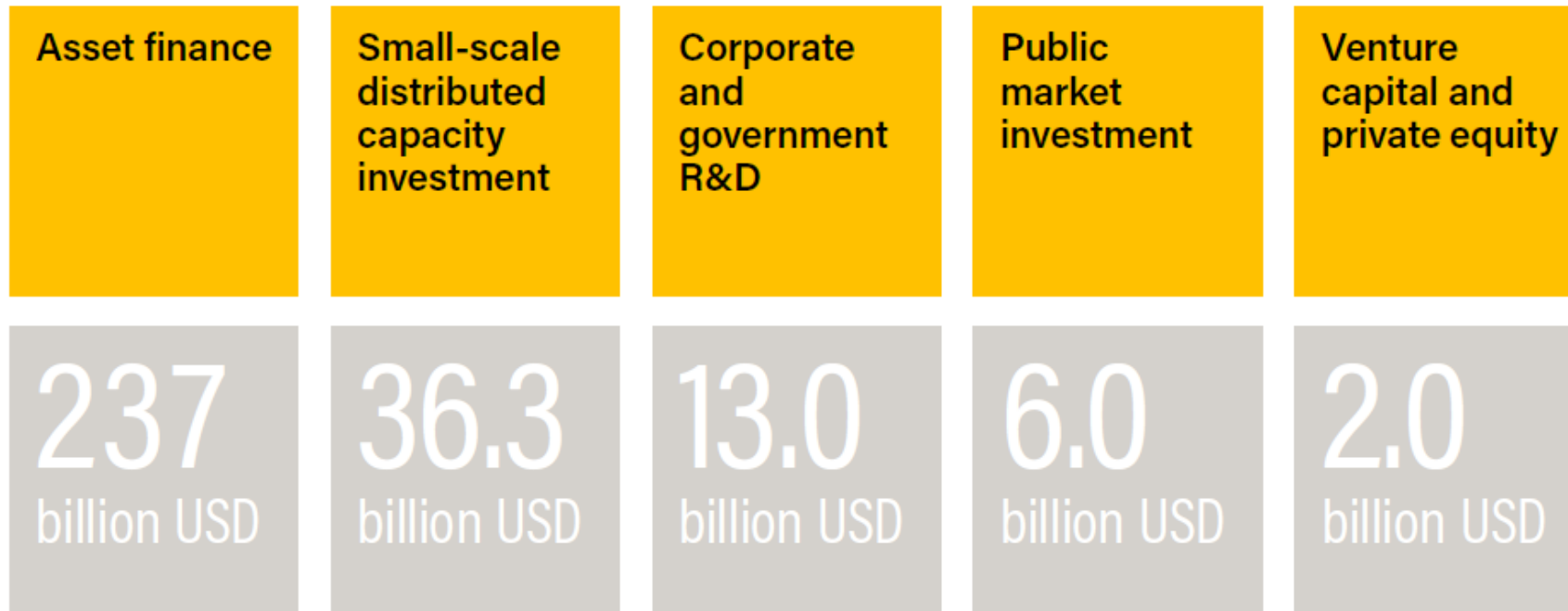
Source : IPCC

- The largest investment is in EE, than RE
- Risk for oil based economy countries if they don't anticipate these changes



# Financing of energy transition

## Financing of renewables in 2017

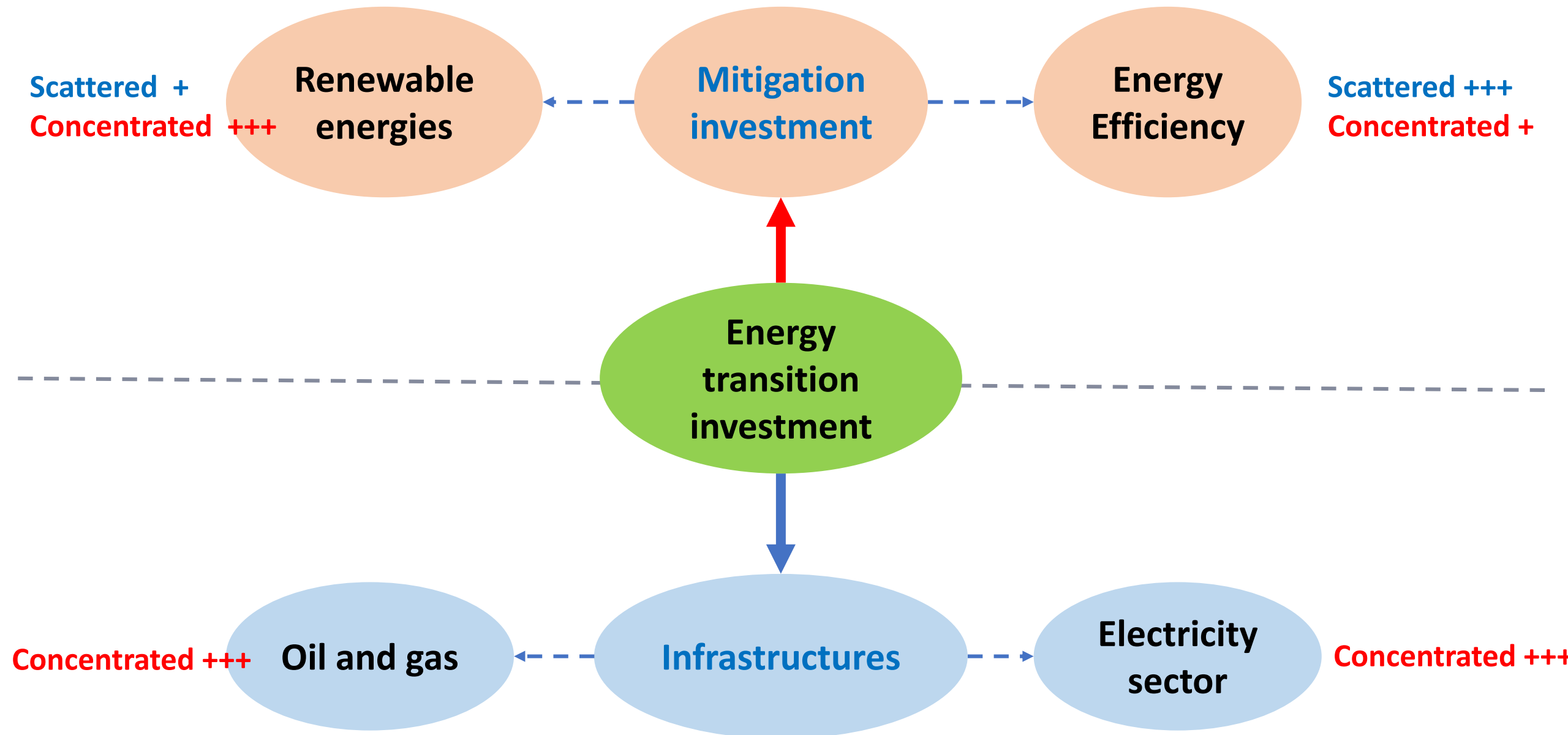


- **Low contribution of public sector**
- **Major financing is through asset finance (private)**
- **Important place for small scale distributed financing**

Source: REN21, 2019

# Financing of energy transition

Typology of investment to be financed



# Financing of energy transition

## Typology of investment to be financed

### Characterization

- Investment intensity
- Types of risks
- Levels of risk
- Transaction costs
- Types of investors
- Financing mechanisms
- Funders
- Public policies and tools



- **Scattered investments : need for smart and integrated financing mechanisms**
- **Concentrated and capitalistic investments : need project financing, PPP, equity, etc.**

# Financing of energy transition

## Large potential of financing sources of energy transition:

- Consumers
- Private equity
- Local banks supported by international resources
- International Financial Institutions
- Public budget
- Donors
- Climate financing (Green Climate Fund, bilateral climate funds, etc.)
- Carbon market (carbon pricing)
- ....

## Conclusion

- Energy transition lead to win-win situation for all type of countries
- Energy transition process already started
- Energy transition in our region will need serious readiness process:
  - Energy transition visions and strategies
  - Expertise transfer and capacity building
  - Energy sector reform
  - Mainstreaming of energy transition in all economic sectors
  - Local financing sector upgrade
- Private sector will be the main source of the transition
- Public investments should used to create enabling environment for investment (infrastructure, grid upgrading, capacity building, planning, etc.)
- Climate finance will help energy transition, but will not be enough
- Need for smart financing mechanisms combining digitalization and decentralization

# Thanks

Rafik Missaoui, Alcor  
[r.missaoui@alcor.com.tn](mailto:r.missaoui@alcor.com.tn)