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X INTERNATIONAL CONFERENCE ON SCIENCE, ARTS AND CULTURE

**Sustainable Energy: Challenges and
Opportunities**

TECHNOLOGY ACCELERATION TOWARDS A LOW-CARBON SOCIETY

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Ufficio Studi ENEA

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About ENEA

Climate Changes: a real issue

Energy demand and GHG emissions: scenarios and policy

Technology acceleration

RD&D

EU SET Plan and EERA

Conclusions

Five R&D Depts, 12 R&D Centres in Italy,
1500 Researchers, €130 mill/yr R&D budget

Energy Technology
and Efficiency

Environment and
Global Changes

Nuclear Fusion
and Fission

Advanced Materials
and Technologies

Biotechnology and
Health Protection



- **The threat of climate change has held the spotlight in recent years**
- **Two other concerns have reemerged recently. The financial crisis of 2008-2009 and volatile oil prices, reinforced the concern that high energy prices can cripple economic growth**
- **It cannot be allowed to distract us from addressing critical and strategic climate change and energy challenge**

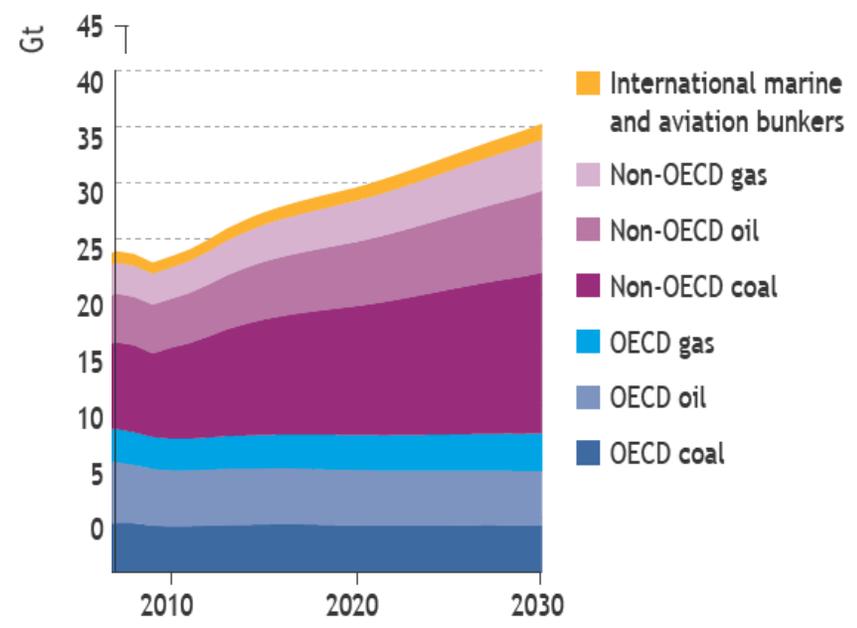
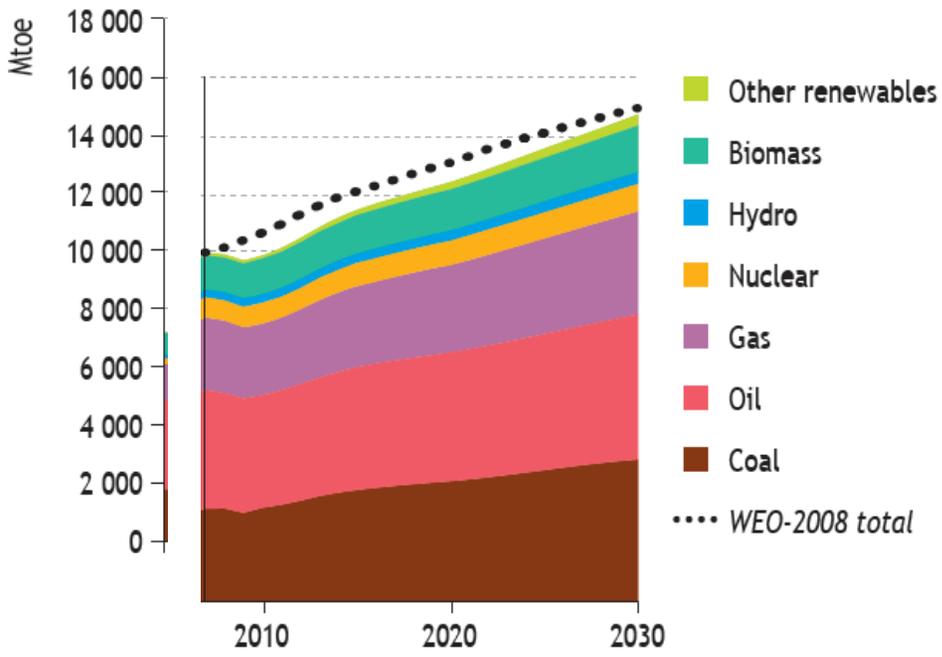
- **Global economy is set to grow up in developing countries like China and India (10 times the actual level)**
- **Economic benefits and people's standards of living will improve**

**BUT THIS MEANS THAT MORE USE OF ENERGY
WILL BE REQUIRED**

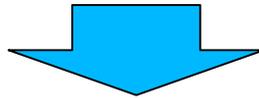
- **Pressure on natural resources and on the environment are inevitable**
- **Climate changes becomes more and more a social issue**

**WE ARE MOVING TOWARDS AN UNSUSTAINABLE
DEVELOPMENT**

Energy demand and CO₂ emissions

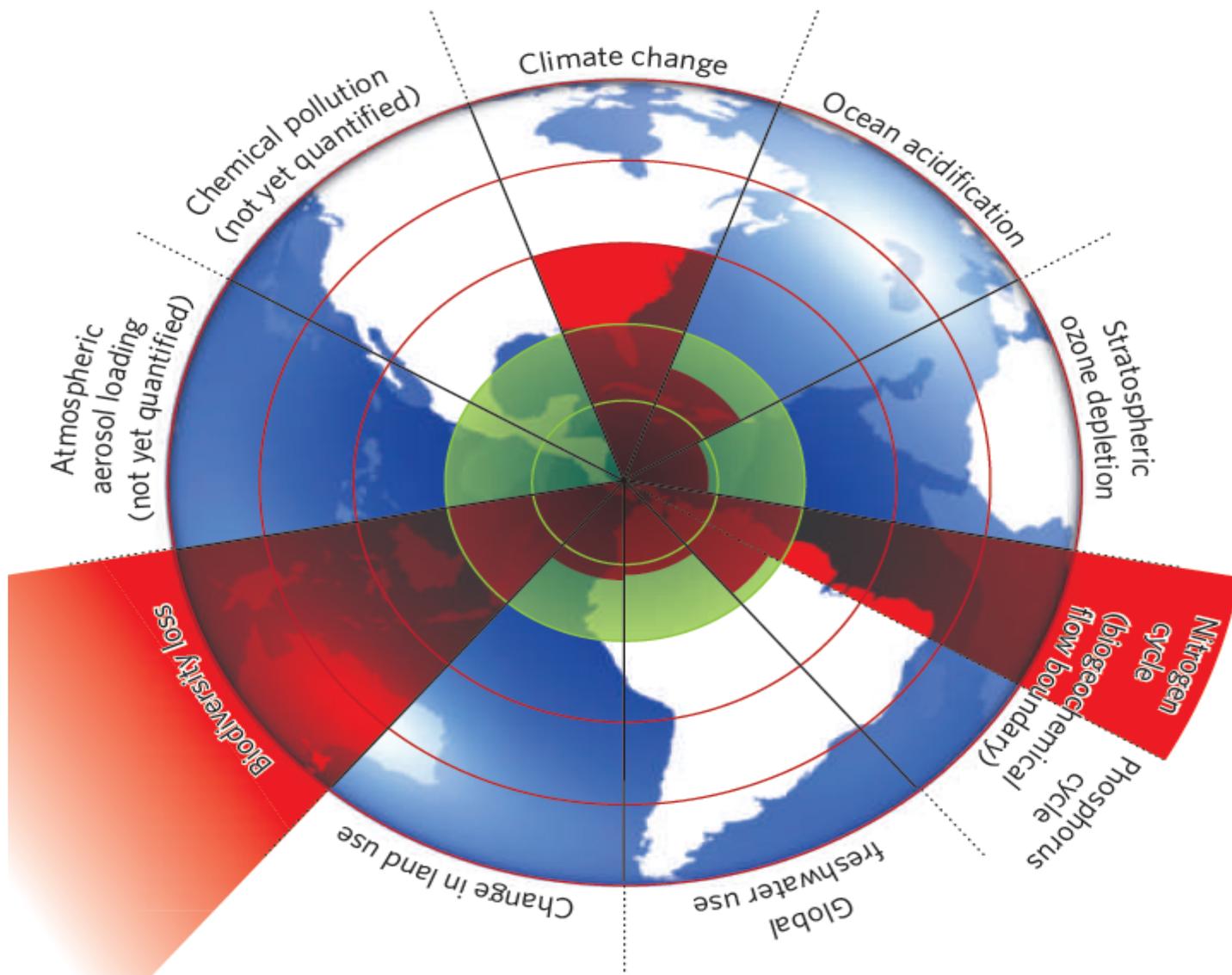


According to UN IPCC about 1000 ppm of CO₂ in 2050 in atmosphere and around 6°C of the global temperature in 2100 are expected in the long term scenario



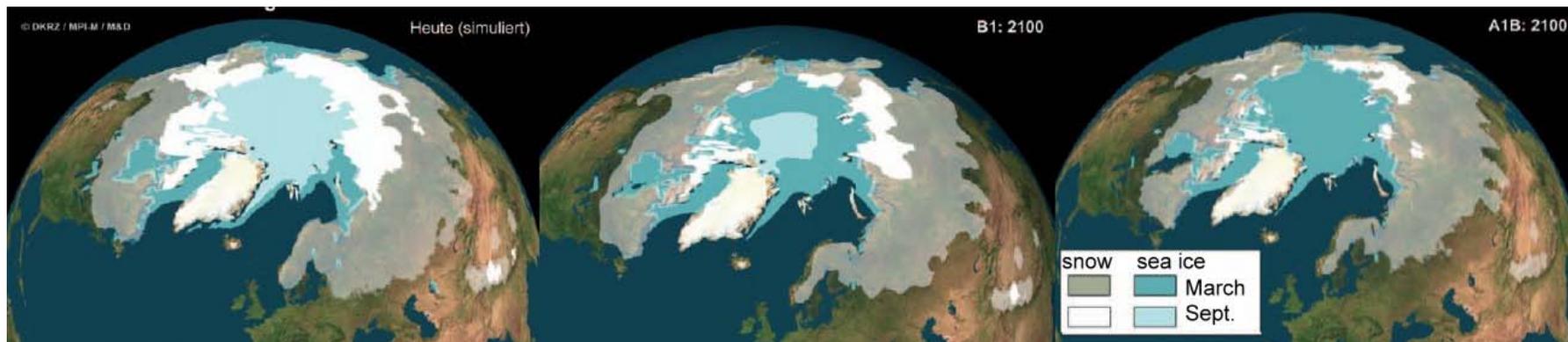
consequences would be significant change in all aspect of life and irreversible change in natural environment

Climate changes: risk factor for Planet



Climate changes: consequences

Arctic ice and glaciers melt are expected



Increase in natural disasters



ISABEL - 2003



KATRINA - 2005

- Ocean heating and sea level
- Early spring and rainfall anomalies
- Increased droughts
- Fires
- Damage by insects
- Spread of tropical diseases
- Thawing of tundra



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2 August 2010 Last updated at 16:12 GMT



Russia declares state of emergency over wildfires

Russian President Dmitry Medvedev has declared a state of emergency in seven Russian regions because of wildfires fuelled by a heatwave.

The death toll from the fires has risen to 40, the ministry of health said.

The Russian emergencies ministry said 500 new blazes had been discovered over a 24-hour period, but most had been extinguished.

Homes have been burnt in 14 regions of Russia, the worst-hit being Nizhny Novgorod, Voronezh and Ryazan.

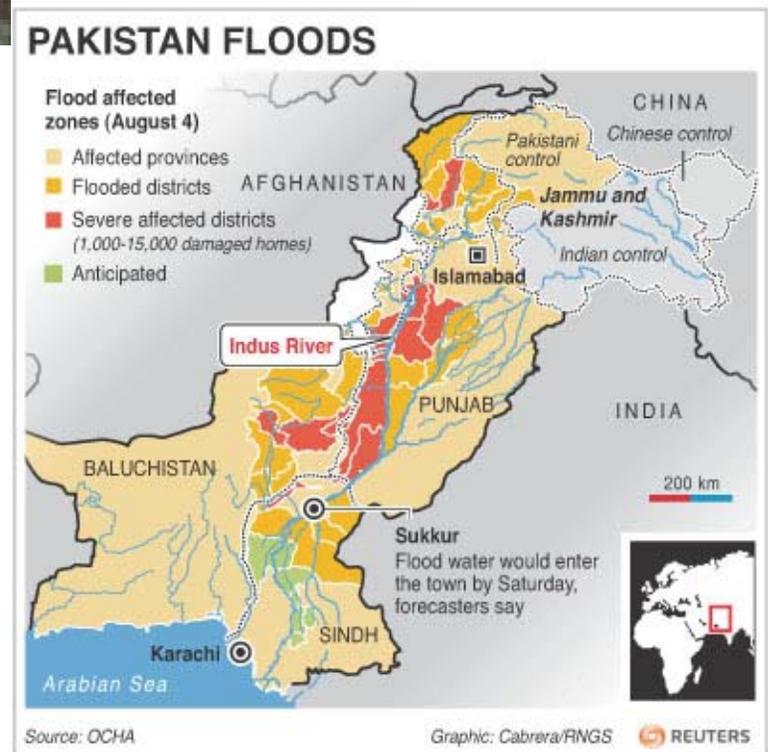
Nineteen of the 40 deaths recorded were in Nizhny Novgorod, the health ministry said.



Smog still shrouds Moscow as peat fires burn outside the city



Climate changes: recent warnings – PAKISTAN



for those wishing to deeper explore this topic, I suggest to read the

**State of the Climate
Global Analysis
July 2010**

**By National Oceanic and Atmospheric Administration (NOAA)
National Climatic Data Center**

- **The current trend is unsustainable**
- **Limiting the increase in global temperature to less than 2.0 °C**
- **Achieving deep cuts in global GHG emissions by 2050**
- **Increasing the role of technology**
- **Recognizing the need of additional funding for development countries**
- **New and more effective policies**

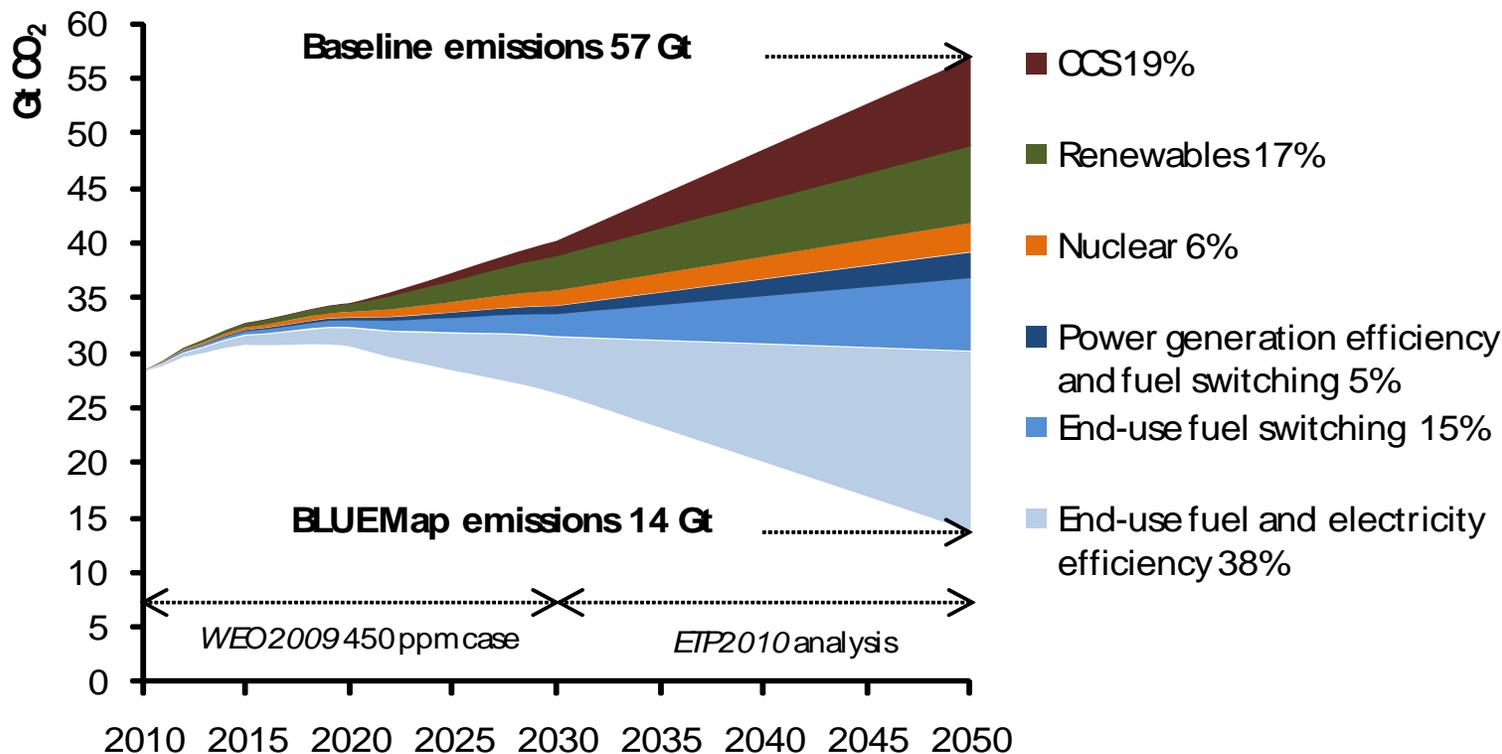
A GLOBAL REVOLUTION IS NEEDED IN THE WAY ENERGY IS SUPPLIED AND USED

- **Many governments confirm their support for the Copenhagen Accord' s principles through increased funding for low carbon energy research and development, new and more effective policies and national emission reduction targets.**
- **If emissions do not peak achieving the needed 50% reduction will become much more costly. In fact the opportunity may be lost completely and more drastic action on a shorter time scale and significantly higher costs may be required.**
- **Developing and deploying low-carbon technologies will require an integrated policy framework that can allow opportunities in this economic crisis context.**

A turning point in the development model

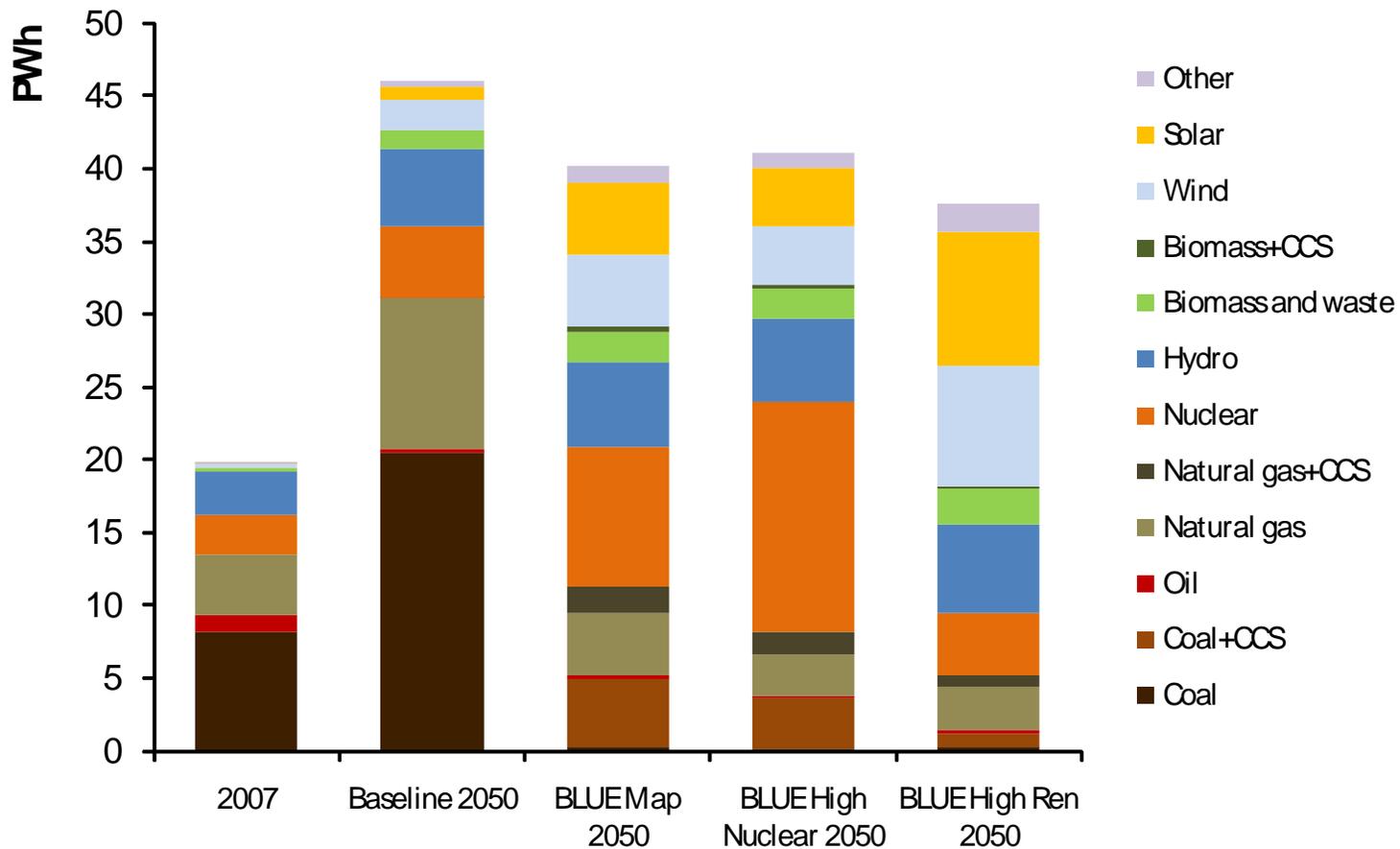
- **The global energy economy will need to be transformed over the coming decades**
- **Low-carbon energy technologies will be at the heart of this revolution**
- **Investment in a significant increase in support of RDD&D is mandatory**

Role of technologies for reducing CO₂

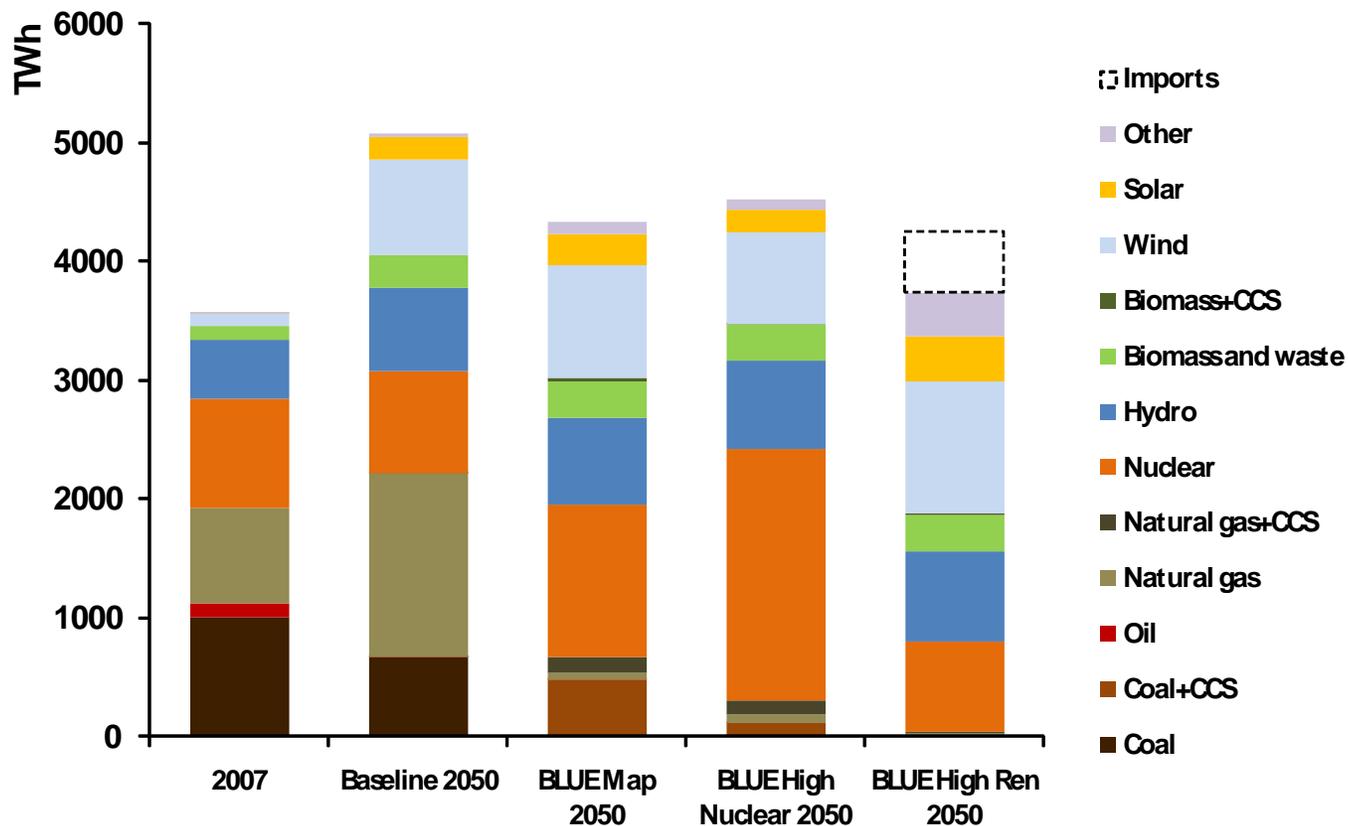


A wide range of technologies will be necessary to reduce energy-related CO₂ emissions substantially.

Role of energy technologies

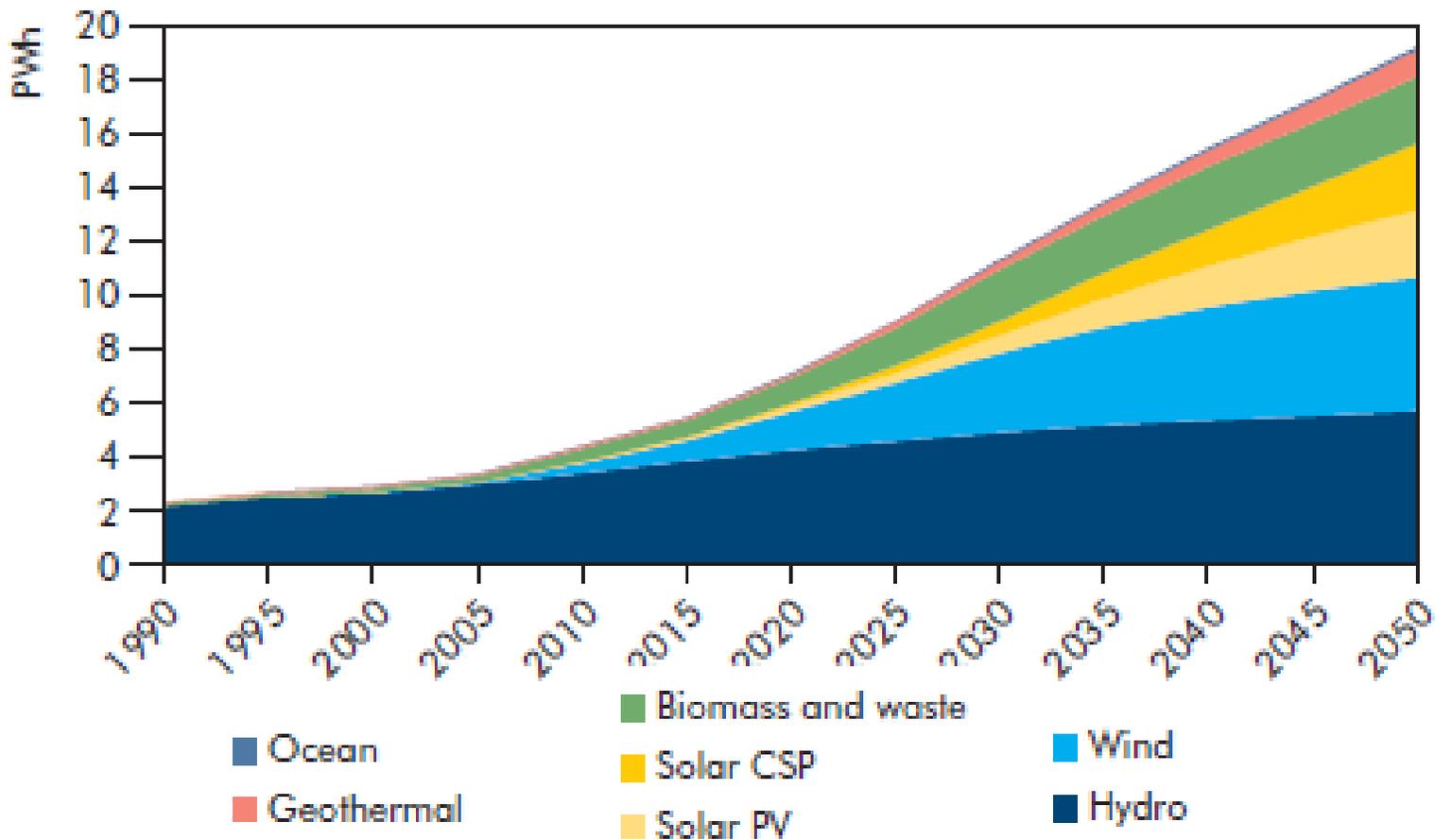


Decarbonization of power sector - Europe



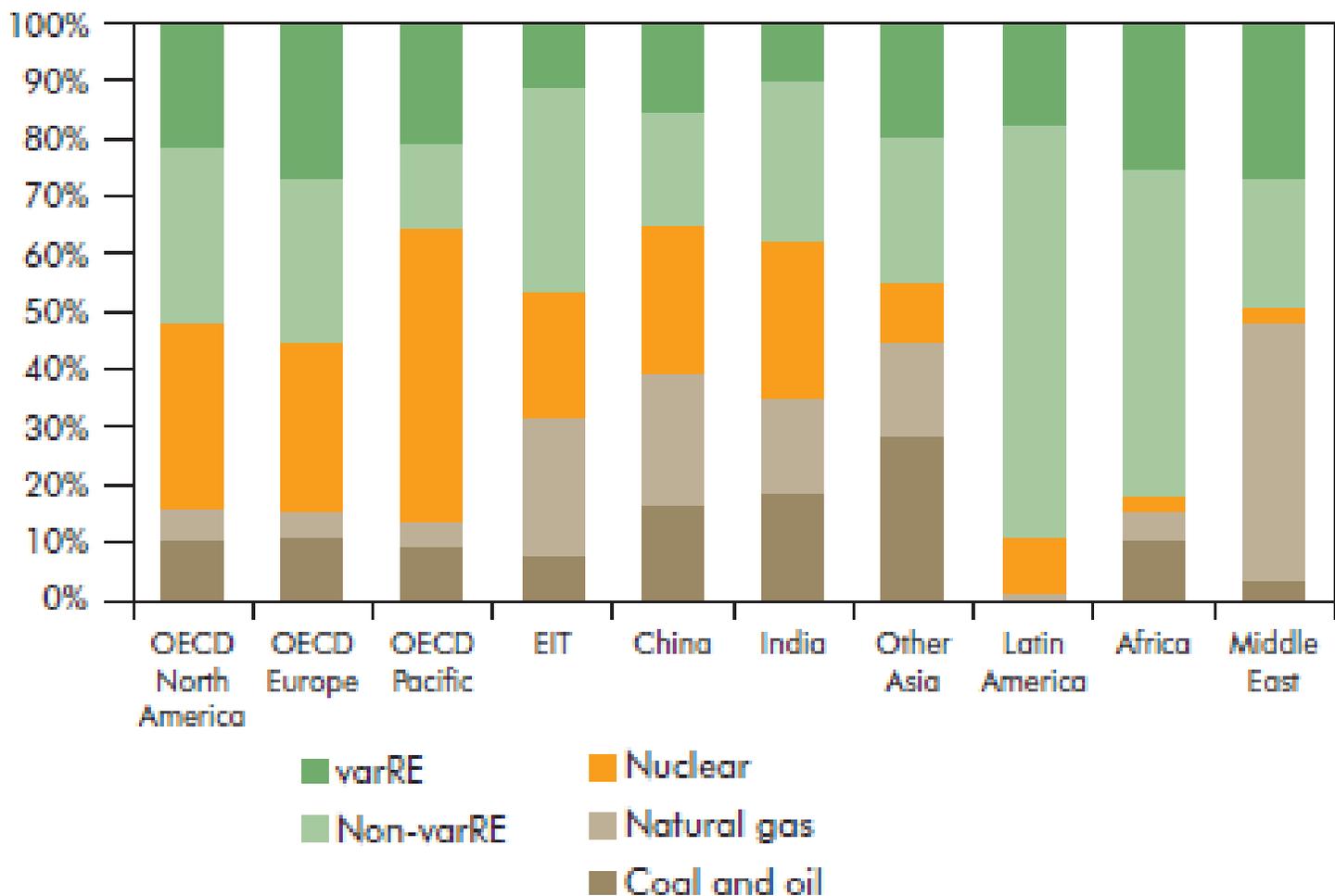
A mix of nuclear, renewables and fossil-fuels with CCS will be needed to decarbonise the electricity sector.

Growth of renewables

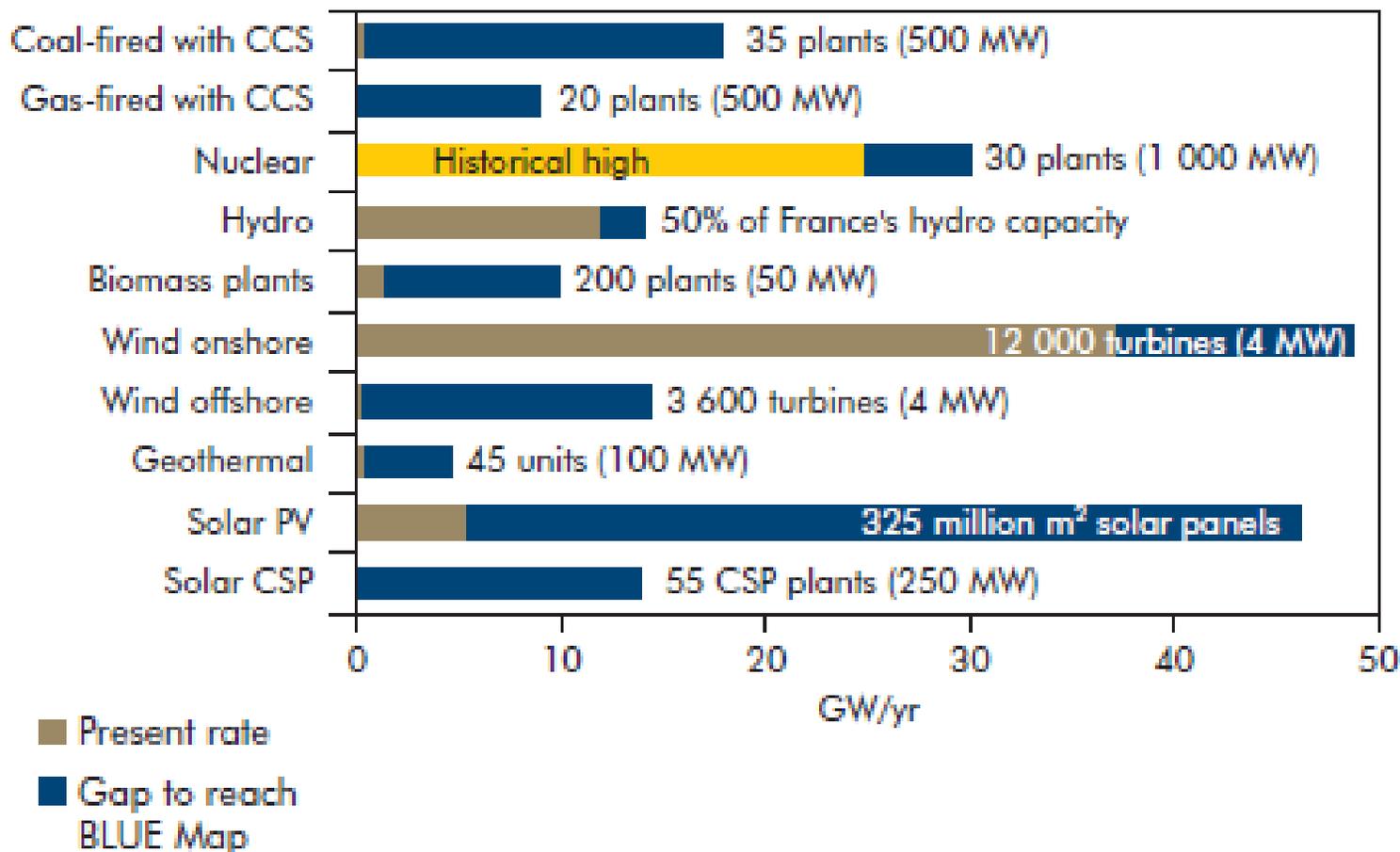


Electricity generation from RES grows strongly. Wind, hydropower and solar provide the bulk of it.

Regional generation mix in 2050



Annual capacity addition to achieve 2050 target



Main challenges:

1. climate change,
2. security of supply
3. industrial competitiveness

Milestones:

Carbon pricing alone will **not be enough to stimulate the investment necessary to reduce emissions on the scale and at the pace required.**

Package of policies which facilitate the deployment of the technologies and also stimulate the development of a clean energy industry, based on innovation and technology development

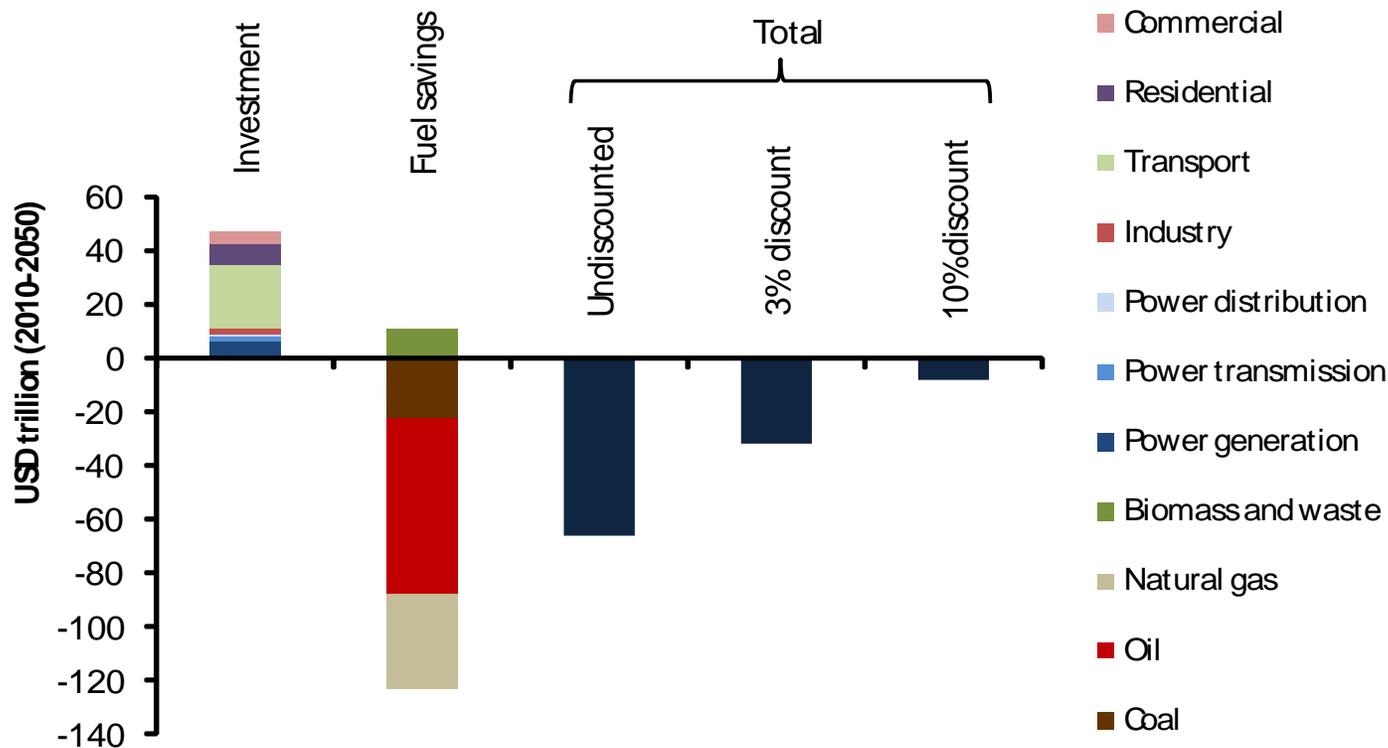
- **Carbon pricing should be complemented by other policies**
- **Policies must be tailored to the technology's stage of development and reflect good design principles**
- **Public RD&D spending must at least double**
- **Governments need to implement best practices in energy RD&D**
- **A number of enabling actions are also needed:**
 - **Private sector leadership**
 - **Expanded human capacity**
 - **Greater government outreach and planning on infrastructure needs**
 - **Expanded, more effective international collaboration**

- **Some of the technologies needed are not yet available**
- **Many other require further refinement and cost reductions**
- **A huge effort of research, development and demonstration will therefore be needed.**
- **Yet public and private sector spending on RD&D has been declining compared to the levels of 70's and 80's and has now stabilized at recently low level**

WE MUST CONVINCING AND BE CONVINCED THAT

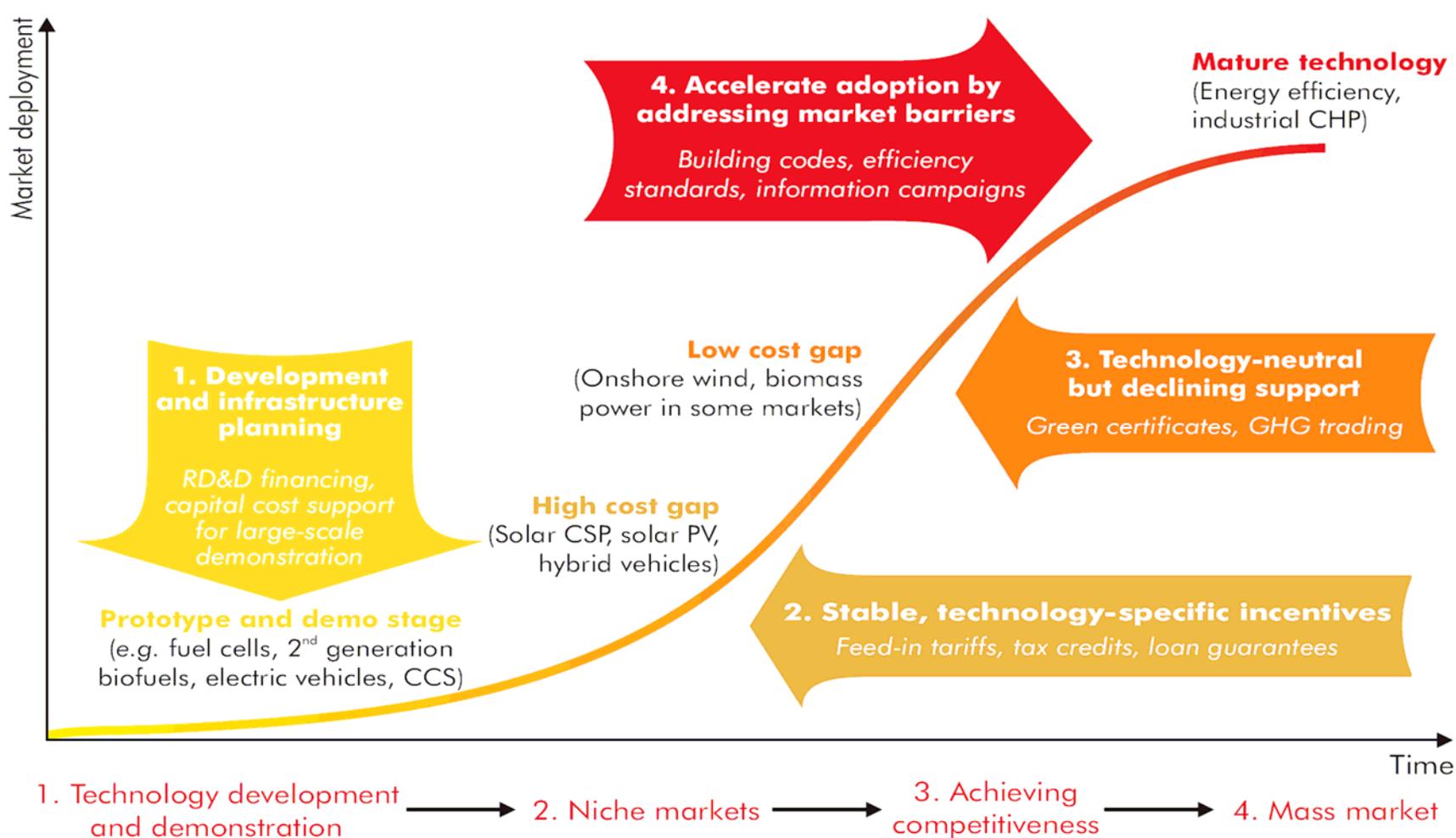
well directed energy R&D represent excellent value for money

Additional investment and fuel saving



fuel savings more than offset the additional investment required

Policies for supporting low-carbon technologies



Government support policies need to be appropriately tailored to the stage(s) of technological development.

- **A huge effort of research, development and demonstration will be needed**
- **Public sector RD&D needs to increase by between 2 and 10 times its current level to bring forward new technologies and to reduce costs**
- **Basic science in areas such as geology, physics, chemistry, materials, biochemistry, nanotechnology and applied mathematics can trigger breakthroughs in critical areas. It is essential to enhance the science base and its link with technology**

EU is tackling the challenge to launch the call for an effective low-carbon policy and efficient energy technologies through a policy whose target is the transformation of the entire energy system

- Facing the world-wide climate change calls for an effective low-carbon policy and efficient energy technology**
- The target is to create a low carbon affordable and competitive technologies market**

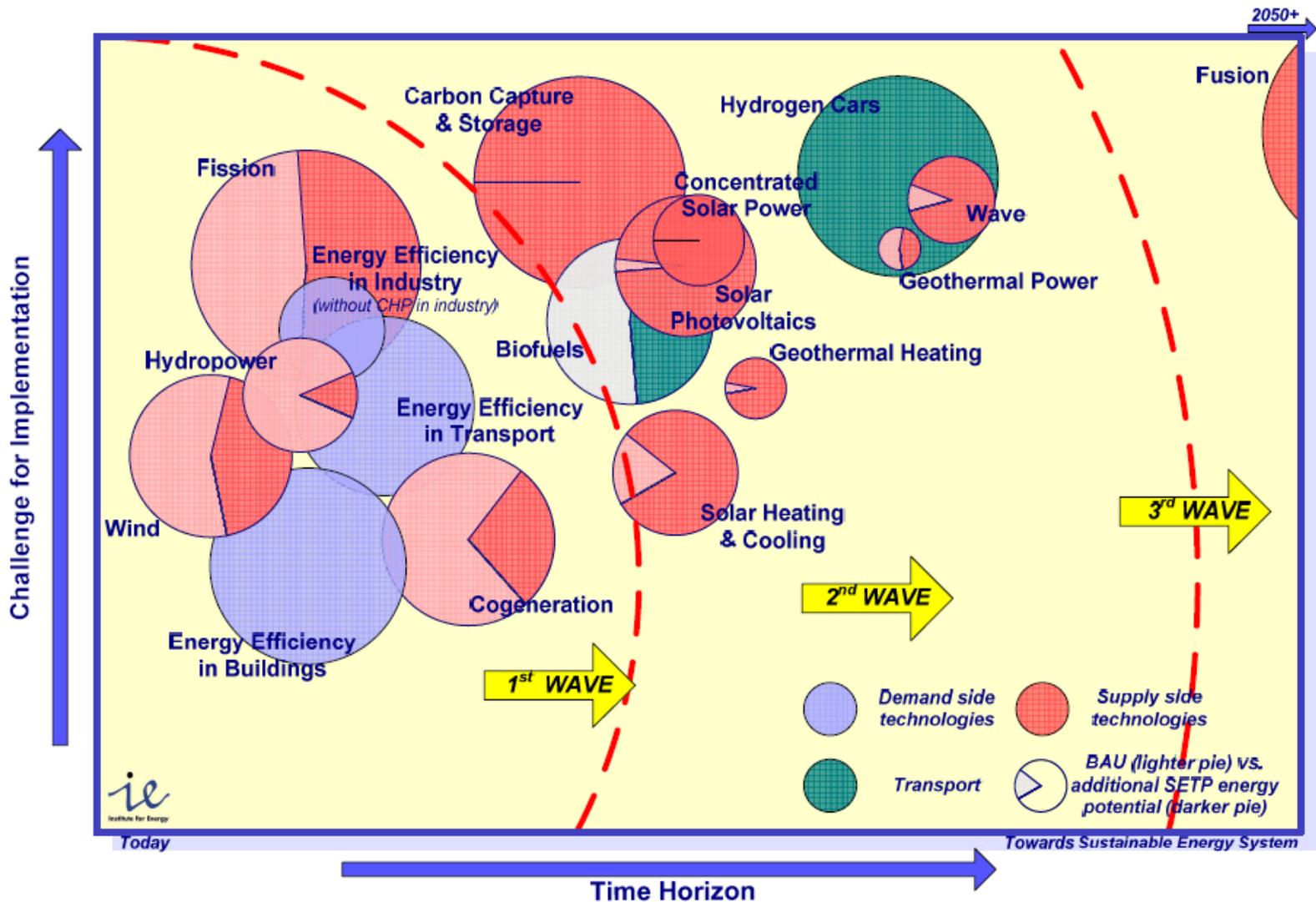


Energy technologies will be crucial to successfully combat climate change and securing world and European energy supply

Initiatives:

- **Bioenergy**
- **CO₂ capture, Transport and Storage**
- **Electricity grid**
- **Fuel cells and Hydrogen**
- **Sustainable Nuclear**
- **Energy Efficiency -Smart Cities**
- **Solar Europe**
- **Wind**

SET PLAN - Potential of technologies



As a part of the SET PLAN implementation, EERA

aims to strengthen, expand and optimise EU energy research capabilities through the sharing of world-class national facilities in Europe and the joint realisation of pan-European research programmes

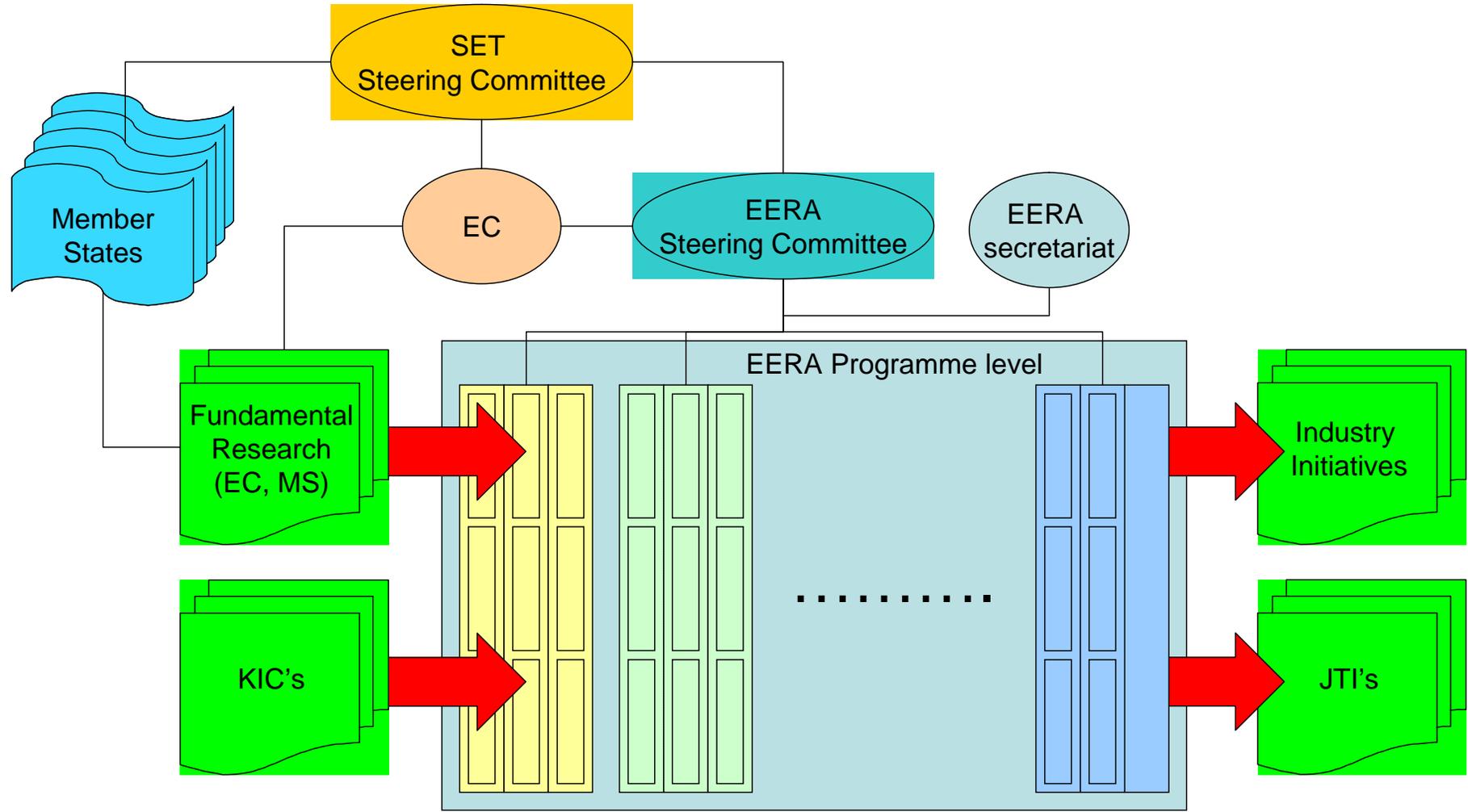
- Accelerate the development of new energy technologies by **conceiving and implementing** Joint Programmes of research in support of the SET-Plan priorities, **pooling and integrating** activities and resources, combining national and Community sources of **funding and maximizing** complementarities and synergies, **including** international partners
- Work towards a long term, durable integration of excellent but dispersed research capacities across the EU, **overcoming** fragmentation, **optimizing** the use of resources, **building** additional research capacity and **developing** a comprehensive range of world class pan-European energy research infrastructures.

- **Strengthen Europe's capacity to initiate and execute large precompetitive high-risk high-gain research and development programmes**
- **Develop links and sustained partnerships with industry to strengthen the interplay between research outcomes and innovation, facilitate industry access to world-class research and ensure the early take-up of promising results**
- **Develop training, education and outreach activities, encouraging researcher mobility, providing a training environment for new researchers and professionals in strategic energy sectors and raising public awareness**

- **Identify and define Joint Programmes of research to be carried out by EERA coalitions consistent with the SET-Plan taking into account activities of European Technology platforms and Industry Groupings**
- **Implement Joint Programmes through the exploitation of existing 'own' resources (staff, facilities and funding as appropriate) from participating organisations, according to agreed rules, and attracting additional resources from other sources adding to scale and impact while ensuring coherence with other activities in the same fields**
- **Share information and strategic plans to help identify strengths, weaknesses, overlaps and gaps, to determine potential areas coordinated efforts.**

- **Proactively engage with industry to create and exploit partnerships of mutual interest and benefit**
- **Support prenormative research efforts at Community level for energy technologies**
- **When appropriate, engage in International Cooperation actions with leading research organisations in developed and emerging nations in support of the EU strategy on energy technology**
- **Systematically monitor and review the progress of the Alliance and its research programmes, using appropriate indicators, in association with the SET-Plan Information System (SETIS)**

EERA Structure



- Harmonised activities based on national programmes and own resources
 - Flexibility to determine joint priorities is required
- Described through a Description of Work (DoW)
 - Areas: wind, PVv, CCS, CSP, materials for nuclear, geothermal, etc..
 - Objectives, time line, expected results
 - Resources for a specific activity

- Within a Joint Programme, sub-programmes may be defined
 - Examples: Wind, CSP, CCS.....
- If the programme is up and running, harmonisation / alignment with EC research priorities
 - Add new EC co-funded projects into the Joint Programme)
 - In line with the defined research priorities of the Joint Programme

- Participants can decide where they want to put how many resources
 - But in line with the objectives / milestones of the Joint Programme
- This is based on voluntary actions
 - They can not be forced to change research priorities
- Contribute to the writing of the Description of Work (DoW)
- Participants can use their involvement in EERA for acquisition purposes
 - National level
 - EC co-funded projects

CONCLUDING REMARKS

- CLIMATE CHANGES IS AN ISSUE
- ENERGY DEMAND SCENARIOS SHOW THAT THE LEVEL OF DEVELOPMENT IS UNSUSTAINABLE
- AN ENERGY REVOLUTION IS NEEDED
- INCENTIVES TO ALLOW TECHNOLOGY ACCELERATION MUST BE FILTERED BY POLICY
- RD& D REPRESENTS EXCELLENT VALUE FOR MONEY
- INTERNATIONAL COOPERATION INCREASES THE SUCCESS OF INITIATIVES

- **Define global research needs, by continuous and extensive consultation with all key stakeholders**
- **Align research priorities with Industry needs by fostering competitiveness: technological transfer, demonstration activities and training**
- **Improve SMEs involvement by adjusting the R&D Programme and by application of SMEs-dedicated tools**

Can we be optimistic?

G20 nations account for more than 90% of worldwide finance and investment, dominating the clean energy landscape. Excluding R&D, more than 110 billions of USD was invested in the G20 clean energy sector. Investment by virtually all G20 countries has grown by more than 50 % over the past 5 years. Rebounding from a sharp downturn in 2008 and early 2009 clean energy investments averaged a robust 32 billion of USD in each of the last three quarters of 2009.

It is an encouraging sign for the future, many governments prioritised clean energy within economic recovery funding, devoting more than 184 billions of public stimulus investments to the sector. The true impact of the support is still to come, with the bulk of the funds reaching innovators, business and installers in 2010-2011



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Thank you for your attention

Hvala na pozornosti

Grazie per la vostra attenzione

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