

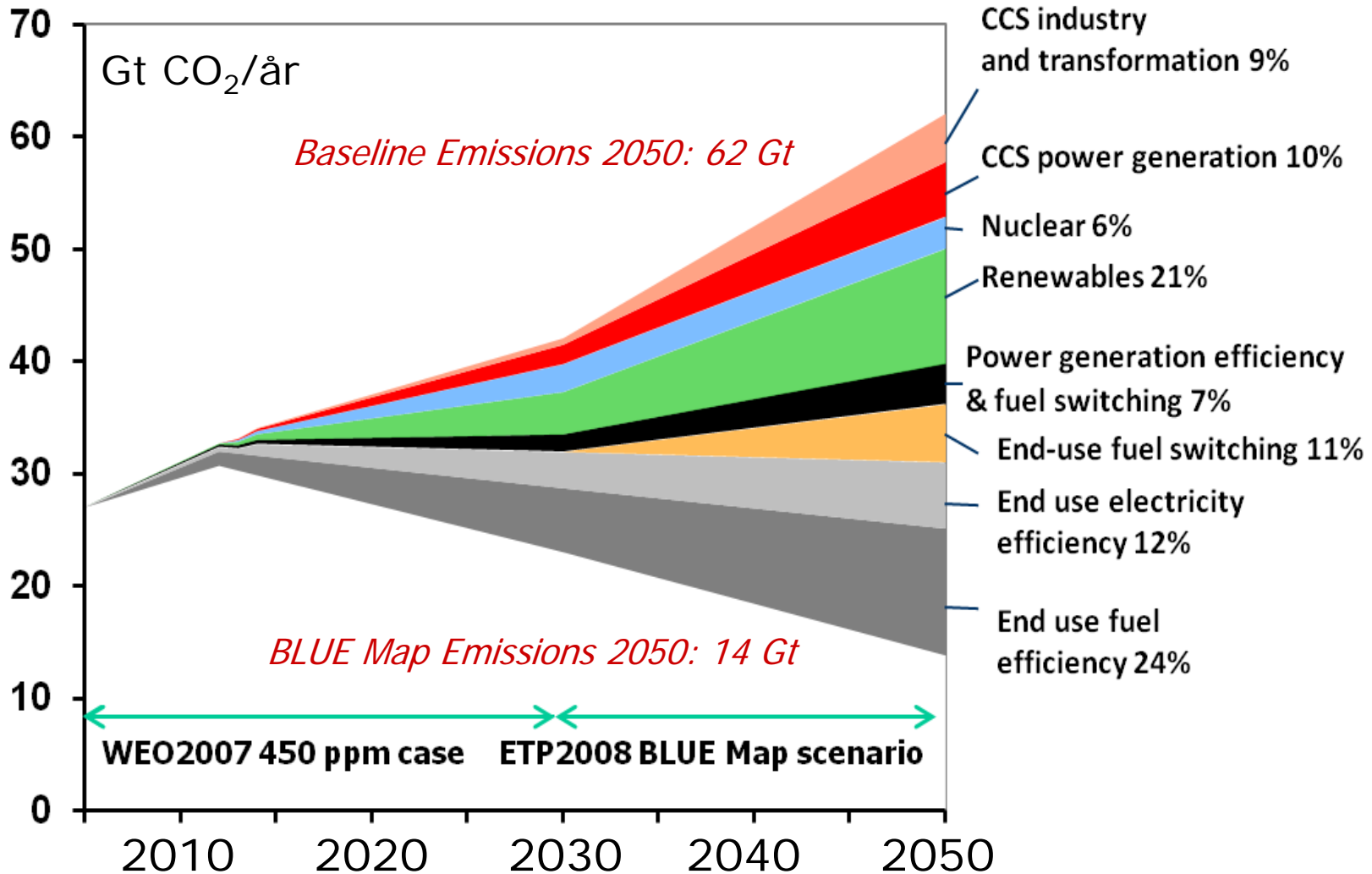


Energy R&D in Norway An International Perspective

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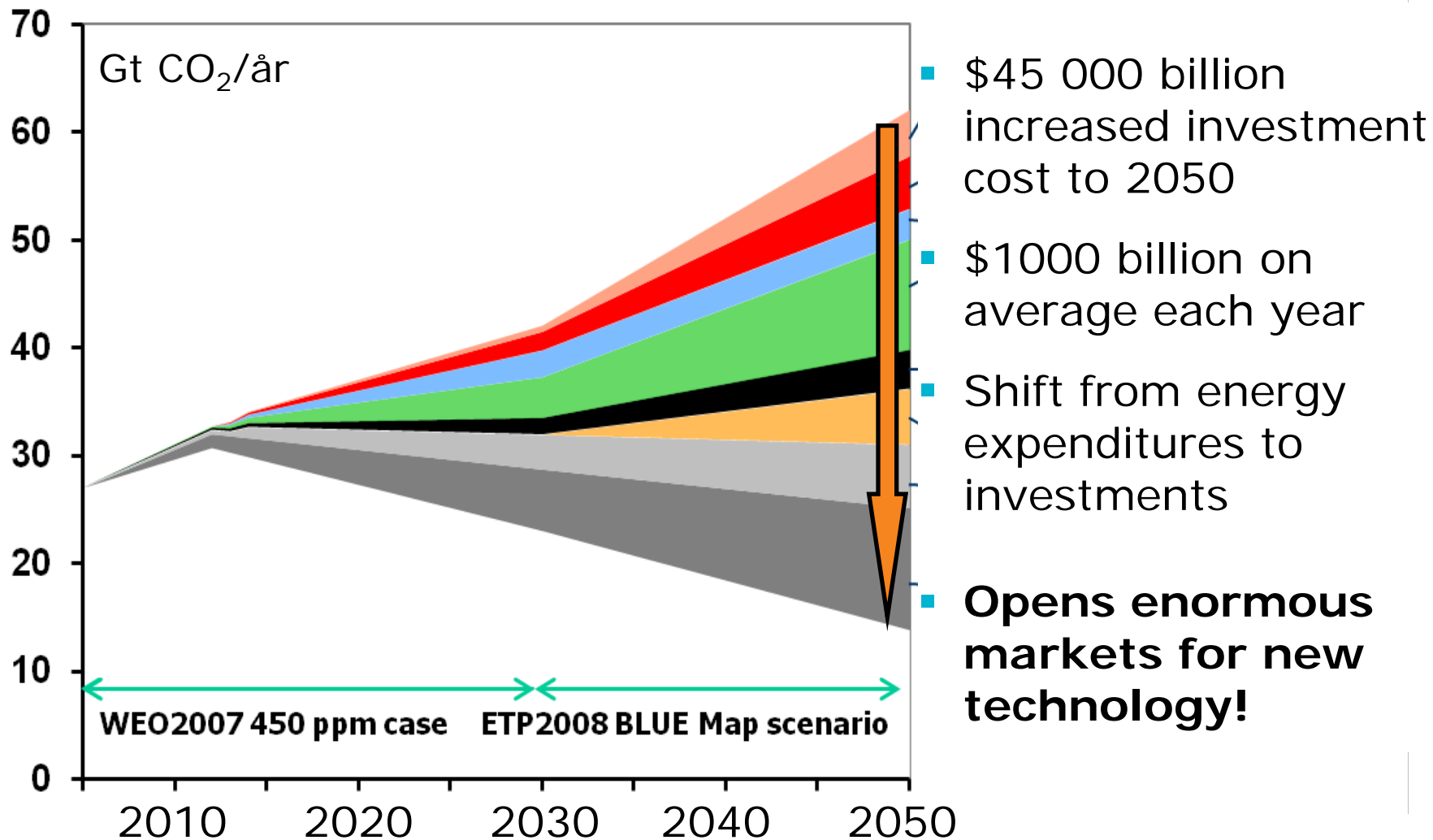


Global Challenges: Need for an Energy Revolution

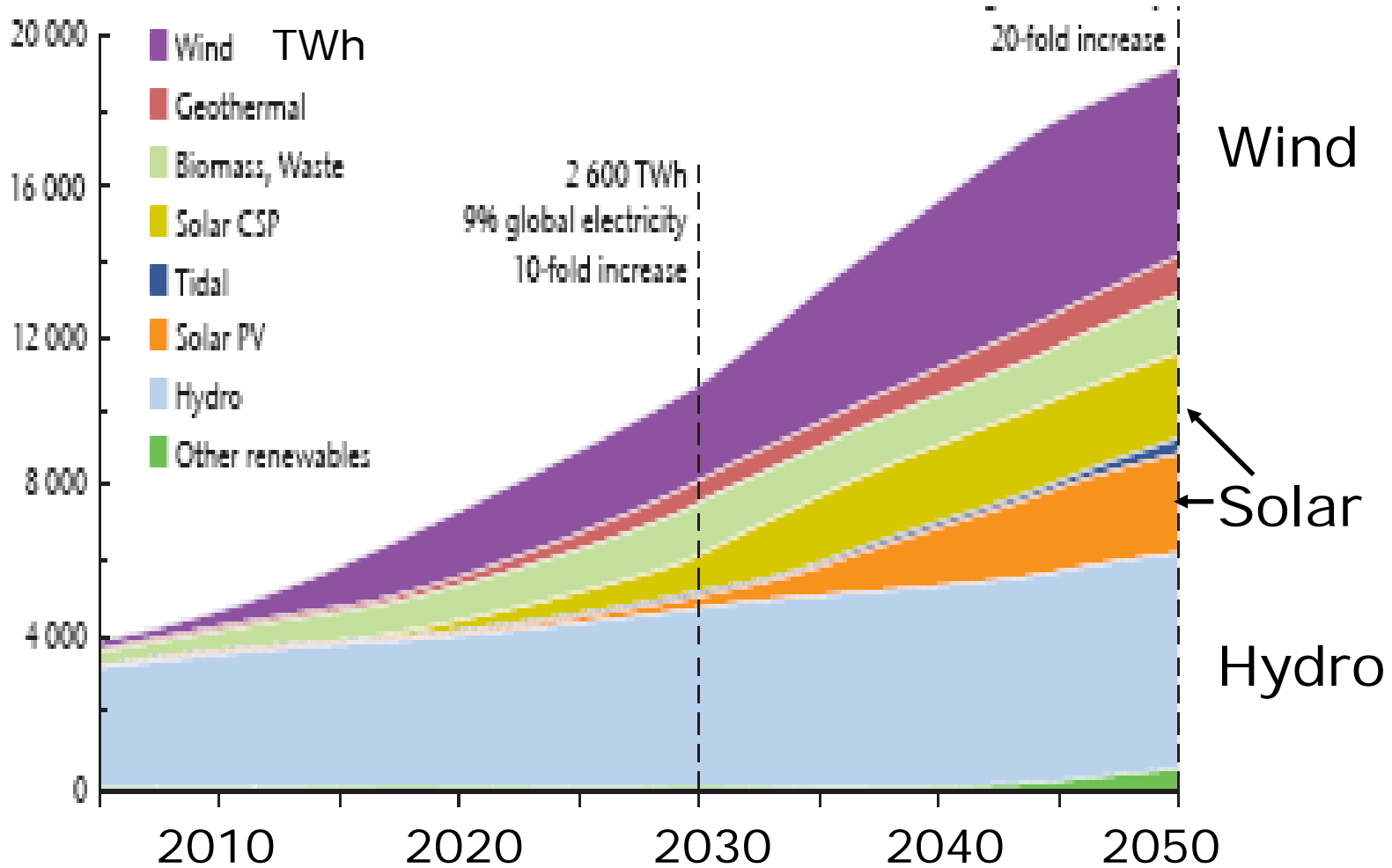


The Revolution will require heavy investments

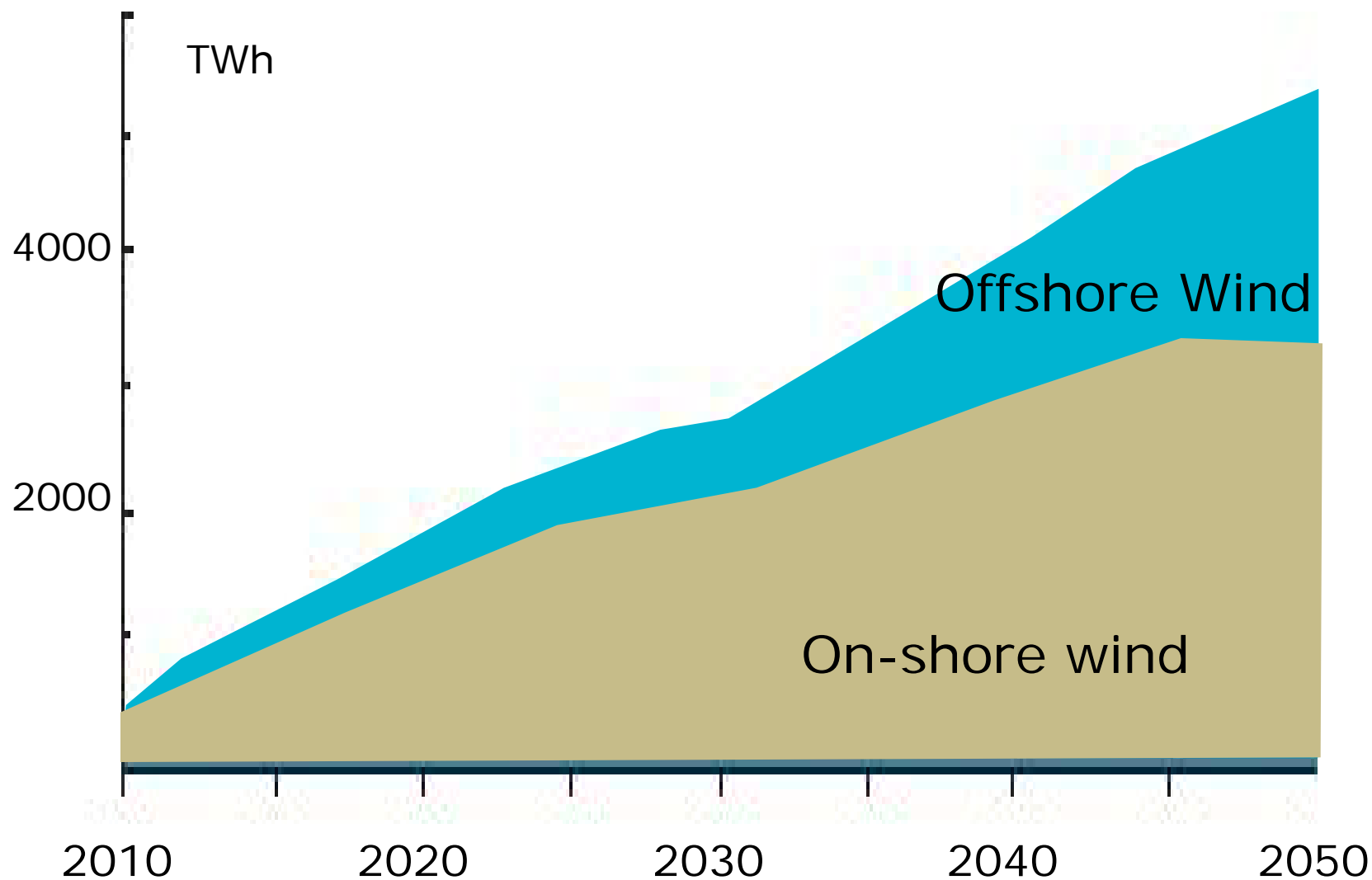
But gives large market opportunities



Power Generation from Renewables



Wind Power generation in BLUE Scenario



The Shaping of an Enormous Market

- 2000 GW wind power must be installed globally by 2050
- Approx 1/3 offshore
 - On average 15 GW each year the next 40 years
 - At least one Doggerbank per year or 45 Sheringham Shoal
- Investments amount to 450 billion NOK per year based on today's cost

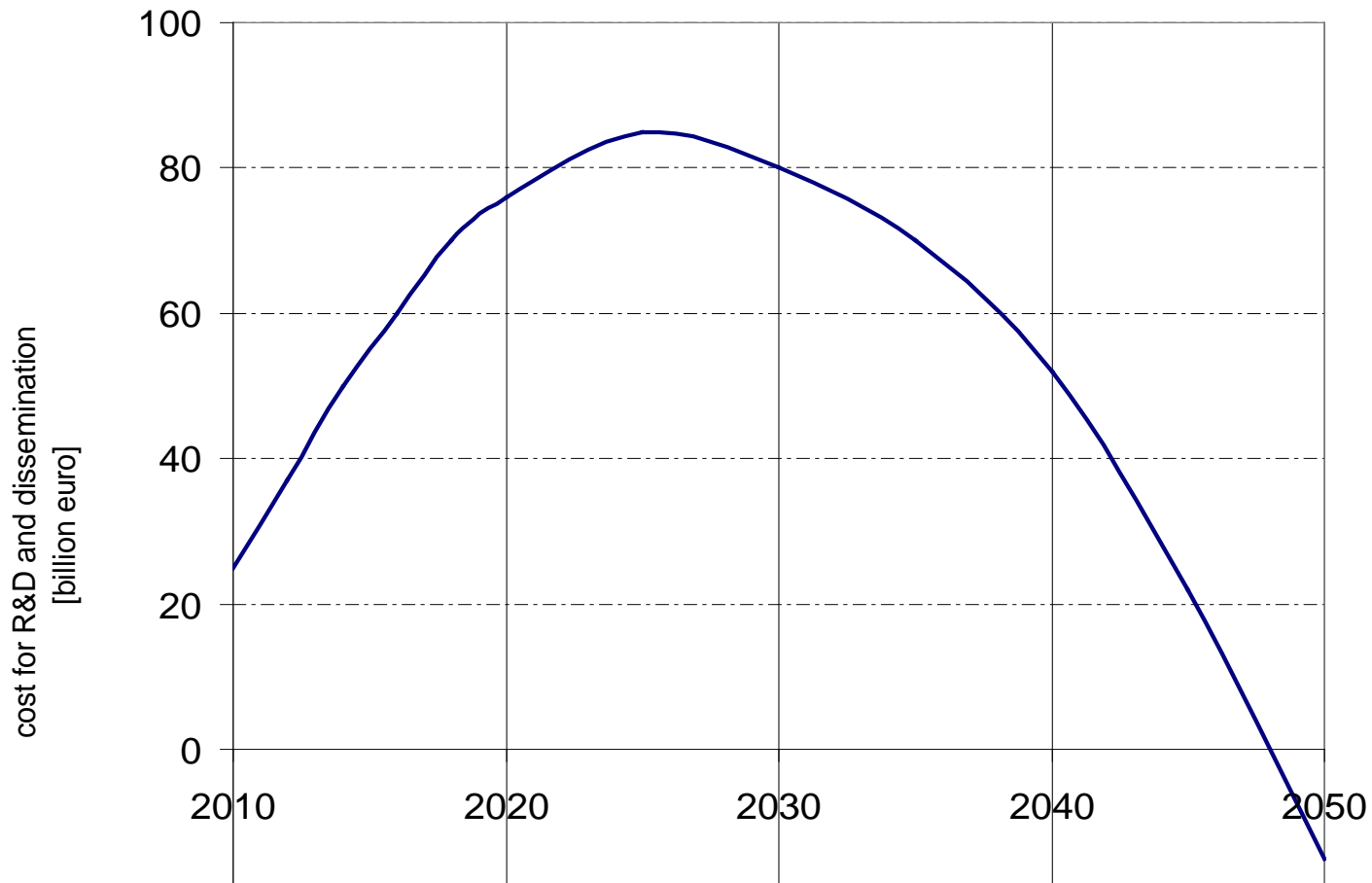


The Revolution Requires R&D Efforts

- Without a successful R&D effort the cost of the transition will be much higher
- R&D constitutes a small share of the investment costs
- R&D efforts must be scaled up early and will require significant involvement by governments

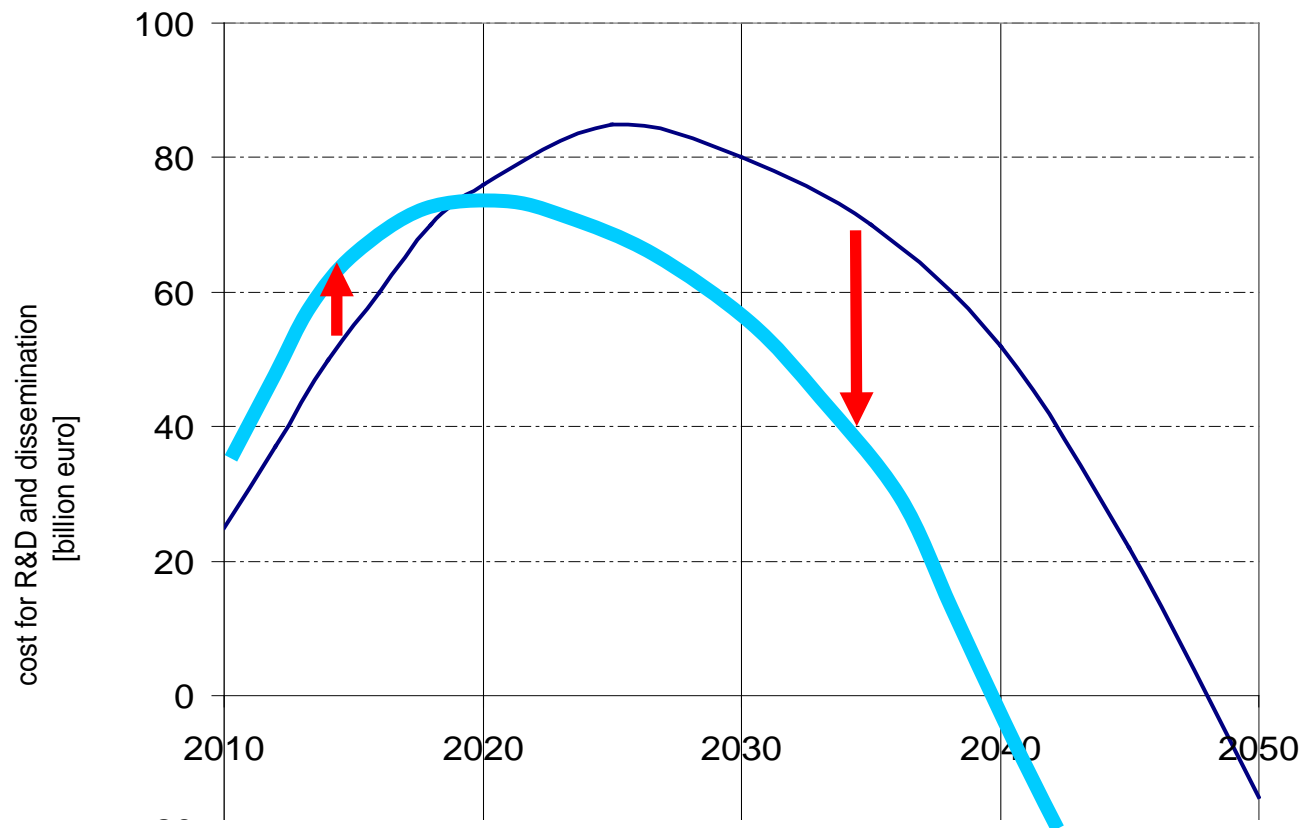
Financing the Revolution

Annual expenditures meet a cost-mountain



Financing the Revolution

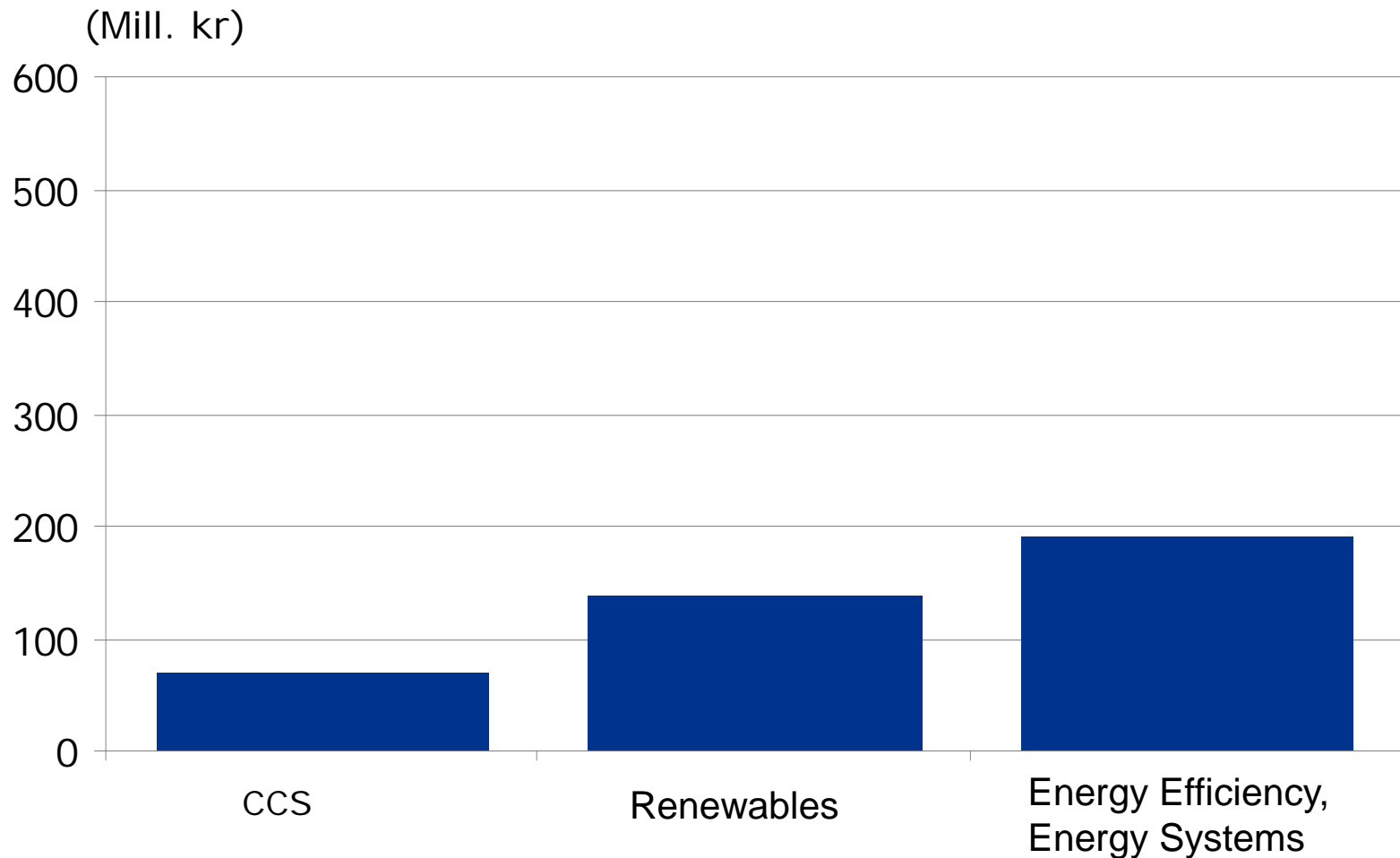
More R&D gives a steeper learning curve and reduced overall costs



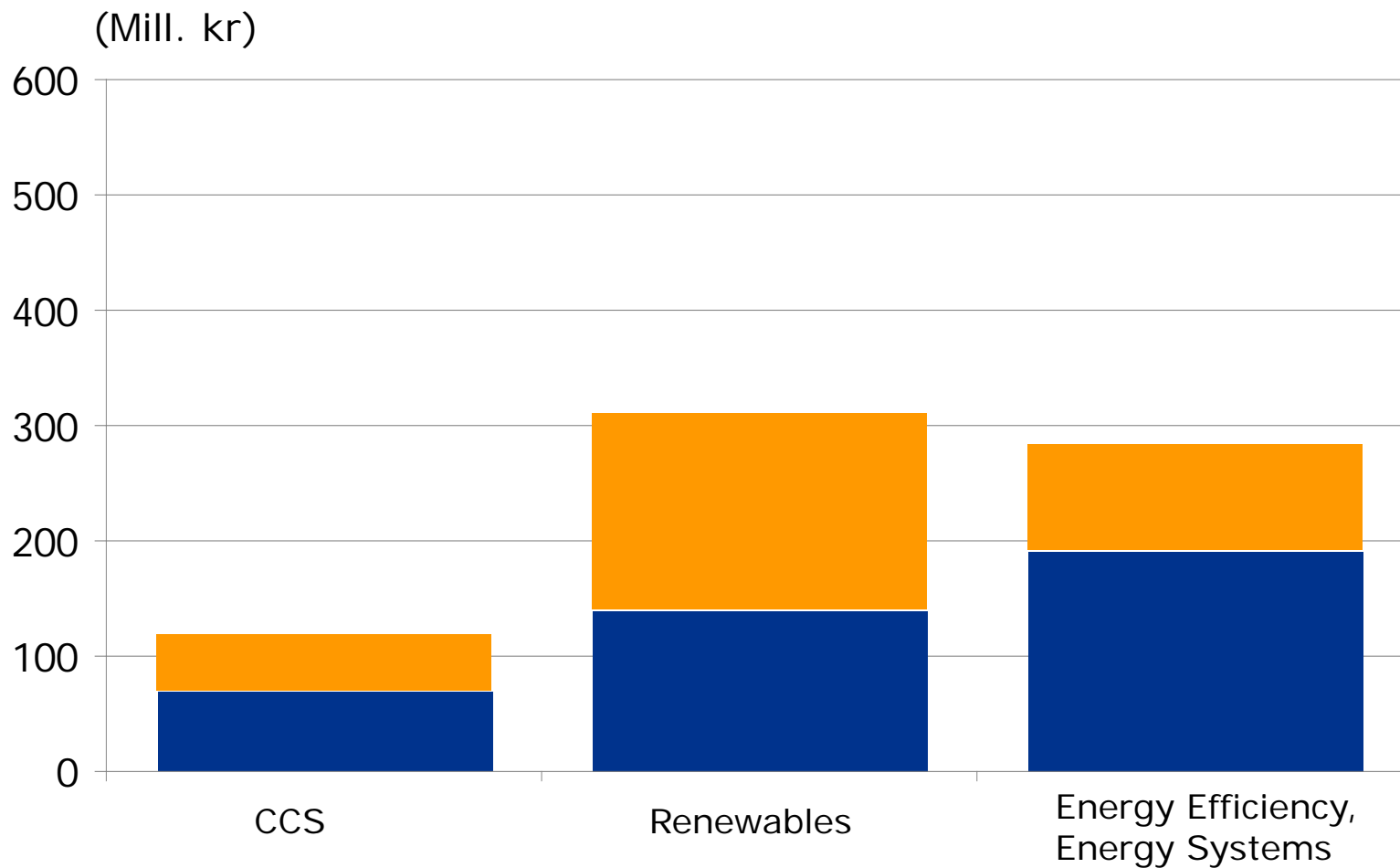
National climate agreement increases R&D investment

- A broad-based political agreement in Parliament
- Enables Norway to pursue a new, long term climate policy
- Provides a major boost to research and innovation within climate and energy research
- Builds on Energi21 – R&D strategy for the energy sector
- Research Council Norway is translating the new initiative into action
 - Increased programme budgets
 - New Research Centers

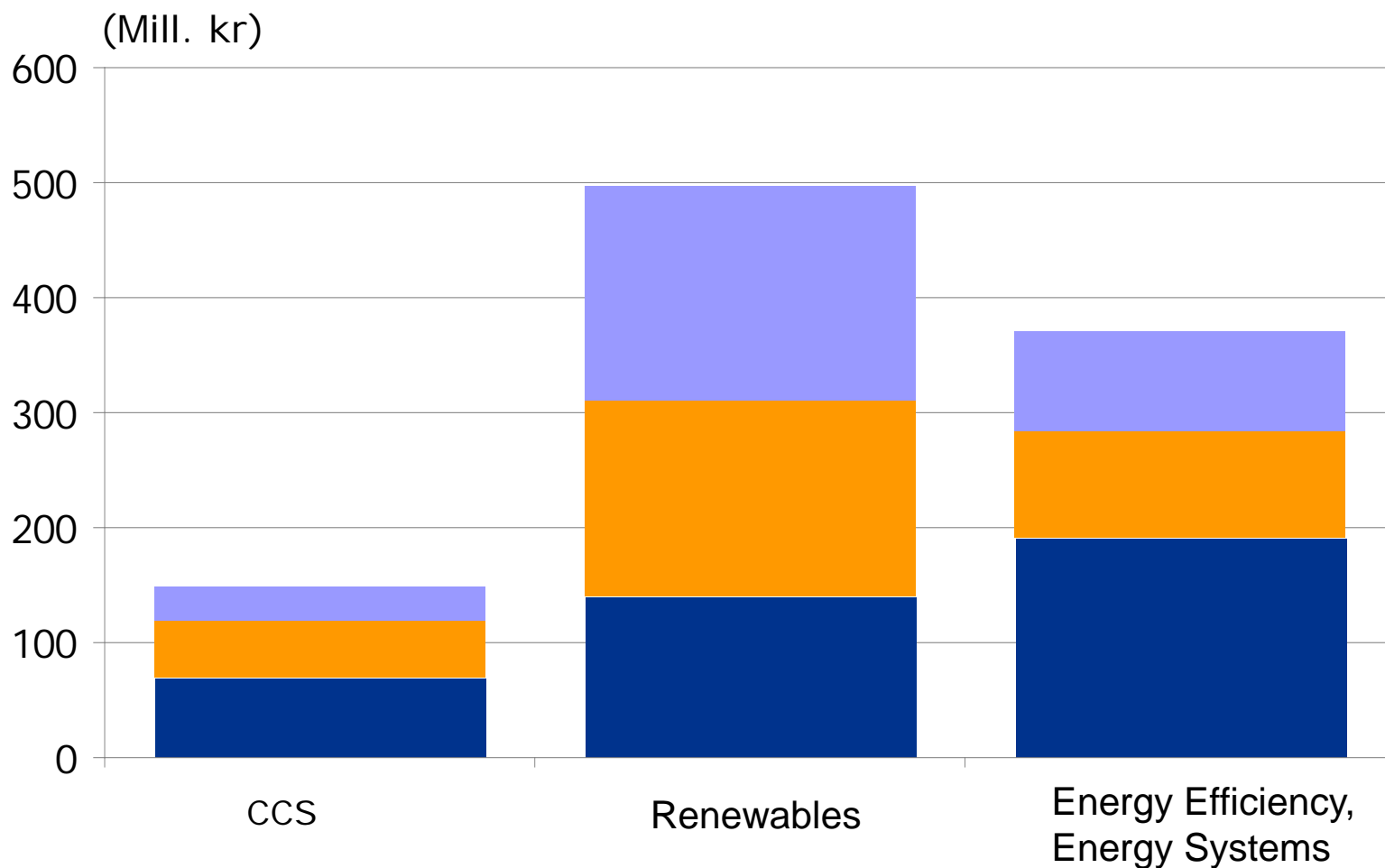
RCN Budget Environmentally Friendly Energy 2008



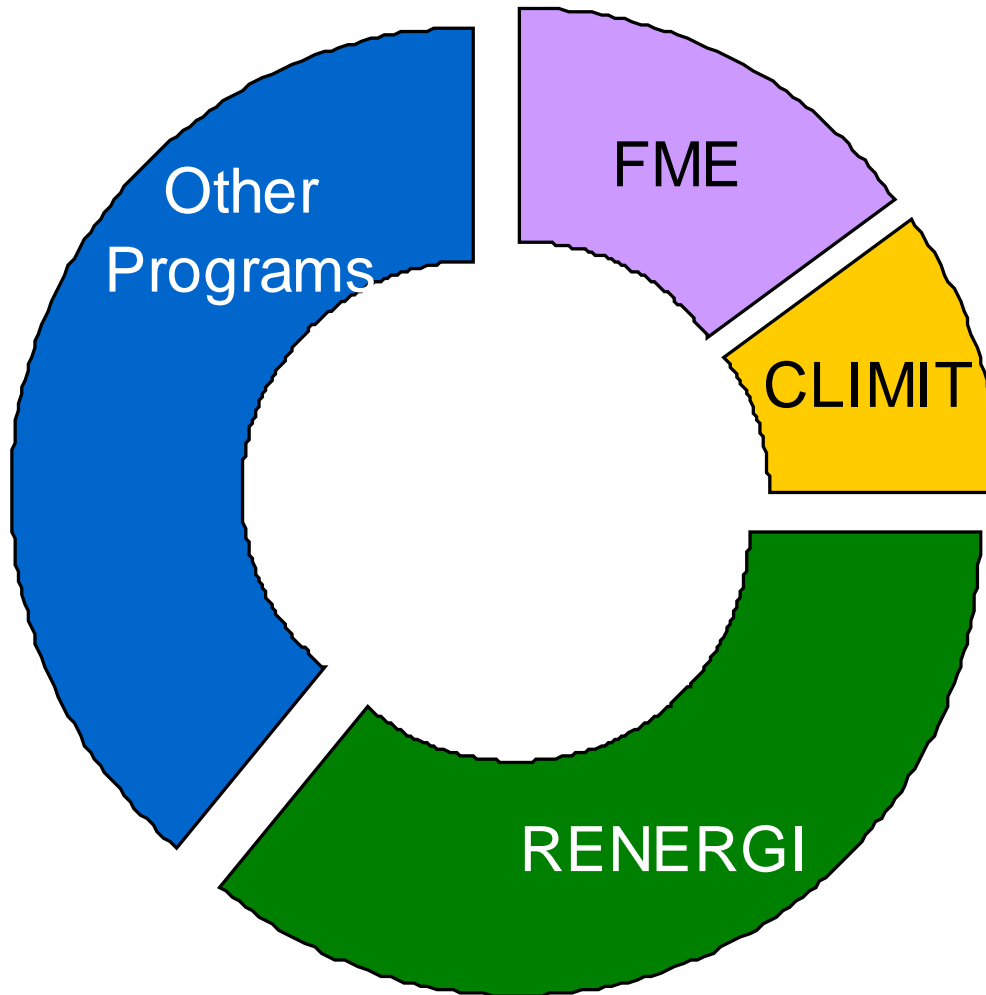
RCN Budget Environmentally Friendly Energy 2008 + Climate Agreement 09



RCN Budget Environmentally Friendly Energy 2008 + Climate Agreement 09 + Climate Agreement 10



Environmental Friendly Energy Close to a three-fold increase in R&D Budgets



Eight Centres for Environment-friendly Energy Research

CO₂ capture and storage

Offshore wind technology

Offshore wind energy

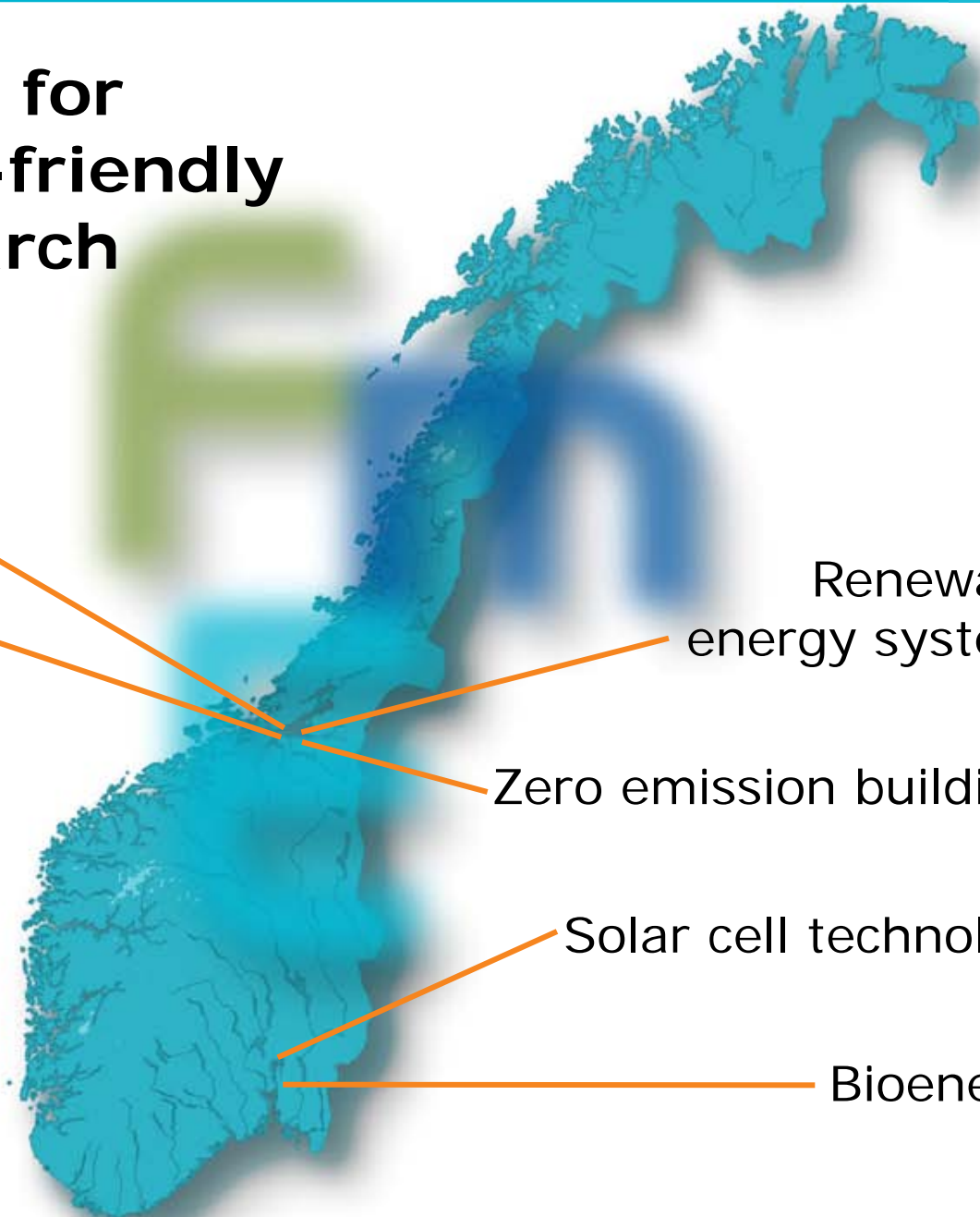
CO₂ storage

Renewable energy systems

Zero emission buildings


Solar cell technology

Bioenergy



Centres for Environment-friendly Energy Research (CEER)

- a new strong initiative in the energy sector

- Ensure efficient and responsible use of public R&D funding
 - Stronger strategic direction – allow for concentrated and focused research of high international standards
 - Long-term (5+3 years) – predictable
 - Stimulate cooperation between education, research and industry
 - Nodes for international collaboration
 - Profile attracts
 - Human capital
 - Financing
- 
- A background image showing a wind farm with several wind turbines on a grassy field overlooking the ocean under a blue sky with white clouds. The water in the foreground is dark blue with white foam from waves.

Increased funding for offshore wind R&D

- RCN investment in offshore wind increased by 550% over the last year
- Current portfolio is 105 mill € of which the support from RCN is about. 50%
- Ongoing projects will finance more than 80 PhD/Post doc
- Estimate new PhD/post docs through 2016: 130-150
- Financing mechanisms
 - CEER
 - RENERGI, including test & pilot components
 - Test infrastructure

Norwegian R&D Revolution 2008-2010

- Increase of nearly 3x R&D volume in less than 3 years
- Quickly absorbed without quality reduction
- Massive mobilization
- Research institutes particularly active
- Significant participation from industry
- Increased interest in international collaboration