OECD report

1. **Executive Summary**
    a) Economic growth vs. Climate change: can be compatible
    b) Strong fiscal and structural reform, coherent climate policy
        - Increase long-run GDP by up to 2.8% on average across the G20 in 2050 relative to a continuation of current policies (If the positive impacts of avoiding climate damage are also taken into account, the net effect on GDP in 2050 rises to nearly 5% across developed and emerging economies of the G20)
        - USD 6.3 trillion of investment in infrastructure is required annually on average between 2016 and 2030 to meet development needs globally.
        - An additional USD 0.6 trillion a year over the same period will make these investments climate compatible
        - Green Finance

2. **Reasons for insufficient actions (still updating)**
    a) Perceived high economic and social costs of climate policies
    b) Concerns about competitive disadvantage if stringent (strict) climate policies are not mirrored elsewhere (even if there is "enhanced transparency framework" of the Paris Agreement)
    c) Short-term (but ultimately unsustainable) benefits of cheaper high-carbon options (The threat of future damage from climate change has been too distant to drive sufficient early action, and short-term gain has tended to come first)
3. **How to achieve climate-compatible growth**
    a) Basis for economic growth: investment in infrastructure
    b) We need climate-consistent policies to encourage investment in low-emission, energy-efficient and climate-resilient infrastructure and technologies.
    c) Underinvestment since financial crisis
    d) Essential areas for achieving SDGs:
        - Energy
        - Water supply
        - Sanitation
        - Waste management
        - Mobility services and communications

e) Advanced economies: deficiency in public infrastructure investment
   Emerging economies: need huge investment (growing population)
f) G20 should take the lead in uniting climate and growth efforts:
   - Huge influence on the rest of the world through innovation, trade and development finance (85% of global GDP, 80% of CO2 emissions)
   - Renewable energy: 98% of global installed capacity of wind power, 97% of solar photovoltaic (PV) power, 93% of electric vehicles (IEA, 2017).
g) Removing subsidies to fossil fuels
h) Tax reform: reducing taxes on income and raising taxes on greenhouse gas (GHG)-emitting and pollution or immovable property
i) Climate policy: such as carbon pricing, direct private investment and technological change into low-emission activities in a cost-effective way
a) Investment vs. climate policy
   If investment conditions are not conducive to low-carbon investments, even the best-designed climate policy is unlikely to be effective

4. *(Chapter 4)* Model： Combine climate action with growth policies

a) Based on macro-economic model simulations, it studies the potential impacts on growth and employment of scenarios that combine climate action with pro-growth policies
b) macro-economic context:
   - Many G20 countries are in a low-growth trap
   - Climate change poses a major systemic risk to all economies, but particularly for societies in less developed, less-resilient countries.
   - Delaying action on climate change is likely to result in a more disruptive, substantially costlier transition, as high-carbon infrastructure and other assets will be made obsolete.
   - The benefits of low-emission, climate-resilient growth, including new economic opportunities, need to be equitably distributed across society, reducing potential opposition to climate change policies and helping to ensure existing inequalities are not compounded in the transition

c) Measures (policies) to transfer vs. framework ?

Help workers in declining fossil fuel-intensive production find new jobs in low-carbon sectors while encouraging upward social mobility – part of ensuring a "just transition" for workers

d) 4 scenarios
   - Baseline scenario: the world would remain in a low-growth trap and miss the Paris Agreement goals
   - Unsustainable high-carbon" pathway
   - "Pure mitigation" scenario: the transition more difficult, without specific additional measures to boost growth, the impact of decarbonization is estimated to be small in the medium term on average for G20 countries
   - "Decisive transition: a fiscal initiative in support of climate objectives, structural reforms, combine an increase in public investment with a cut in the stringency of product-market regulations and an increase in R&D spending (country-specific)

e) decisive transition:
   - Undertaking structural reforms so these adjustments occur in the context of high, inclusive growth ought to be seen as an integral part of making the economic case for climate policy action.

f) Macro-economic impacts of the different scenarios will also substantially differ across countries, depending on their sectoral structure and energy consumption.

   E.g. fossil-fuel exporting countries are usually seen as incurring the highest costs in the transition

g) The model simulations: explore the implications of a decisive transition for the main macroeconomic aggregates, including GDP, employment, business investment and the ratio of public debt-to-GDP.

h) Assumptions
   - The investment undertaken is of good quality, and there is relatively strong institutions and effective public governance in place (?).
   - All G20 countries take action on climate: free riders
   - The boost in investment is assumed to be budget-neutral in the medium term and financed by better reallocating tax and spending, which would leave the public deficit unchanged.
   - In most countries, revenues from the taxation of carbon emissions are used to pay down public debt. In countries where

the ratio of public debt-to-GDP is low, however, it is assumed that, in the medium term, those revenues are used to support a further increase in public consumption

- Interest rates set by central banks are assumed to remain at their current level for three years in the euro area and Japan, and to follow inflation and growth developments elsewhere

i) Simulation method:
   - The transition would involve not only undertaking mitigation policies to reduce emissions and achieve a 2°C path with a 50% probability
   - but also complementing these policies with a fiscal initiative (e.g. additional investment in hard and soft infrastructure)
   - and structural reforms that would support long-term growth and reduce adjustment costs.
   - A simulation is also run for a more ambitious climate scenario, assuming a 66% probability of keeping temperature below 2°C.
   - The simulations build on the results from a parallel report for the German G20 Presidency on the scale and scope of energy sector investments needed to increase the chances of reaching this goal (IEA, 2017).
   - Yoda, an OECD in-house semi-structural model: includes international spill-overs and delayed labor-market response to policy (hysteresis effects)
   - some simulations were also performed using macro-economic Oxford model: detailed trade and financial inter-linkages, assess the robustness of simulation outcomes and complement the analysis, but can be simulated only up to 2045

j) Countries:
   - most G20 countries (representing 88% of the total of G20 economies excluding the European Union), based on data availability and the geographic scope of modelling tools
   - Categories of countries: respond differently to mitigation and pro-growth policies, four types of stylised economies are presented depending on their reliance on fossil fuels (net importers or exporters) and their level of development (advanced or emerging economies).
   - Net fossil - fuel exporters in OECD member countries and emerging economies: significant losses in the long term, a large

extent massive disinvestment in high-carbon industries and lower fossil-fuel export prices

- But: if the level of public debt is low, recycling of carbon-tax revenues through additional spending could mitigate those losses
- Net fossil-fuel importers: the GDP impact of mitigation policies would be small in the long term, benefit from the increase in net investment and, to a lesser extent, the decline in international commodity prices from lower global demand.

k) Limitations:
   - They are a stylised representation of the economy.
   - Political decisions, social acceptance and institutional factors, for example will also play a major role in the real world, but are not taken into account in the simulations.
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5. ***(Chapter 5)*** **Policies to encourage low-emission investment**
   - A detailed discussion of the potential uses of carbon tax revenue follows in Chapter 5
6. ***(Chapter 6)*** **Social and economic factors that affect the ability of governments to envision and implement the long-term policy choices needed to stabilize global climate:**
7. ***(Chapter 7)*** **Mobilizing financing: the role of specialized development banks and development finance institutions**

The OECD member countries are: Australia, Austria, Belgium, Canada, Chile, the Czech Republic,

Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Israel, Italy, Japan, Korea,

Latvia, Luxembourg, Mexico, the Netherlands, New Zealand, Norway, Poland, Portugal, the Slovak

Republic, Slovenia, Spain, Sweden, Switzerland, Turkey, the United Kingdom and the United States. The

European Union takes part in the work of the OECD.

G20:

Australia

Canada

Saudi Arabia

United States

India

Russia

South Africa

Turkey

Argentina

Brazil

Mexico

France

Germany

Italy

United Kingdom

China

Indonesia

Japan

South Korea

References:

OECD (2017), *Investing in Climate, Investing in Growth*, OECD Publishing, Paris. *http://dx.doi.org/10.1787/9789264273528-en*

IPCC report

Data (有待细看)

Some URLs:

https://science.energy.gov/

http://cdiac.ornl.gov/trends/temp/hansen/hansen.html

https://data.giss.nasa.gov/gistemp/ (数据时间周期更长)

IAM and GCM