SCENARIOS IN A CHINESE CONTEXT

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2019 International Forum on Long-term Energy Scenarios for the Clean Energy Transition

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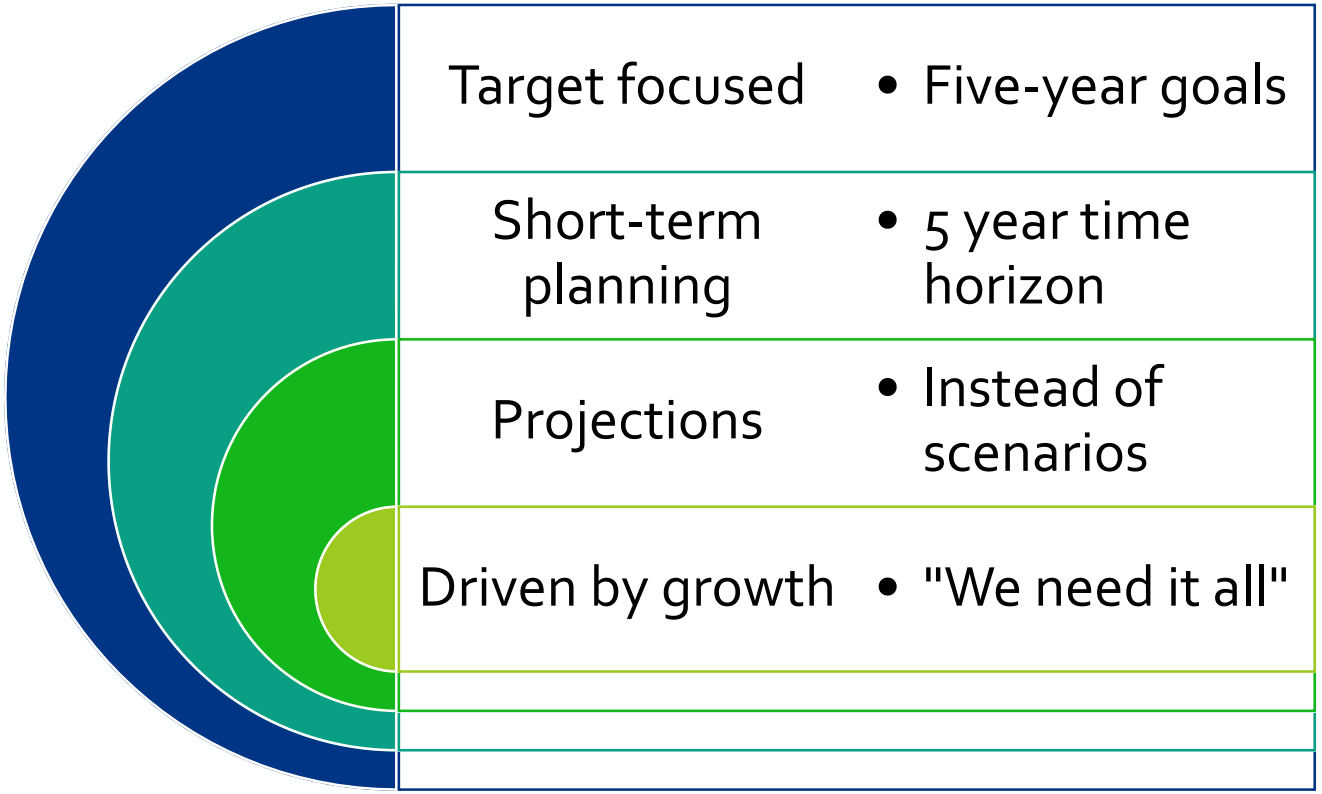
The traditional Chinese way of looking to the energy future



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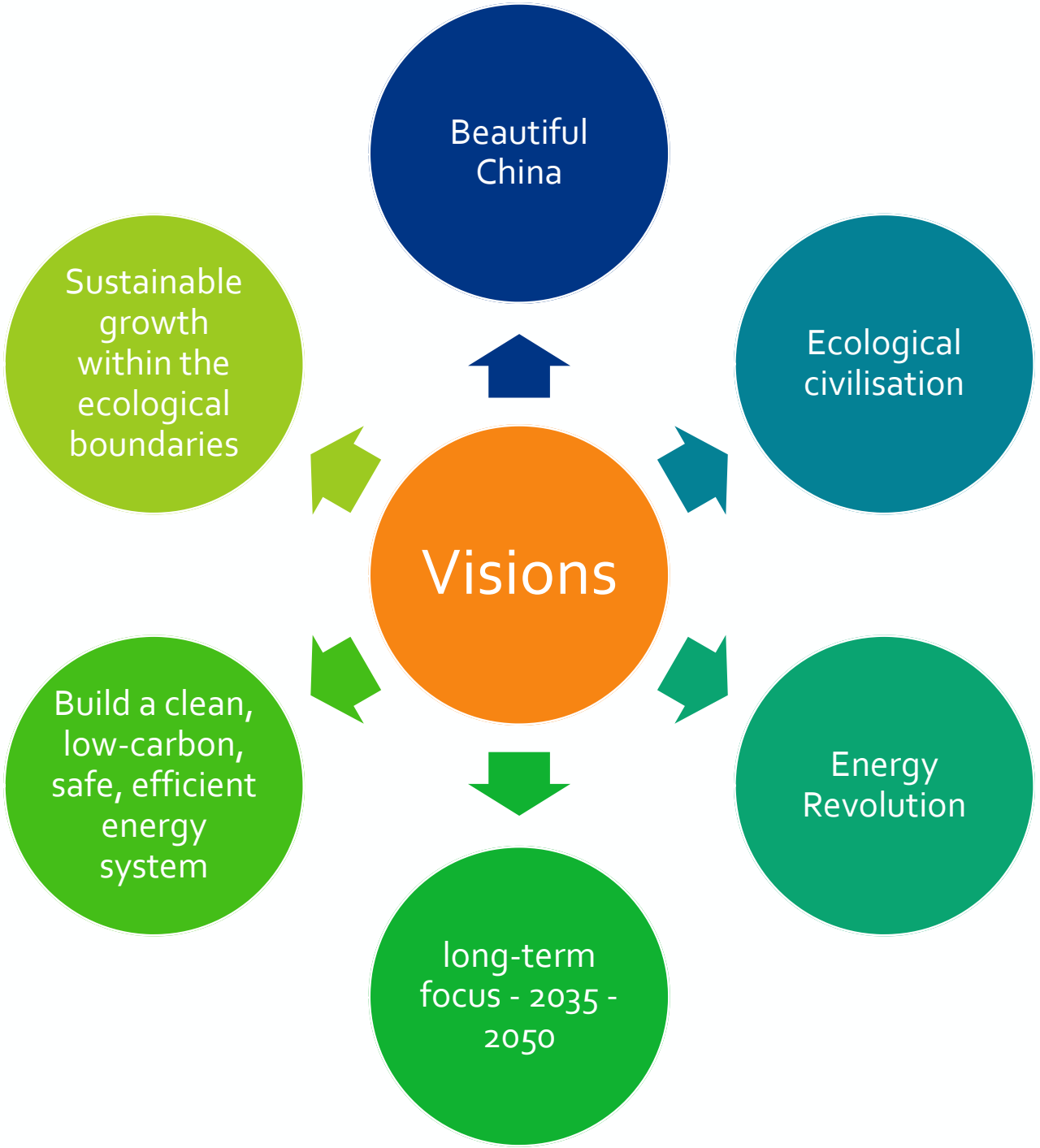
Shift to Vision focus, recognising more radical changes needed



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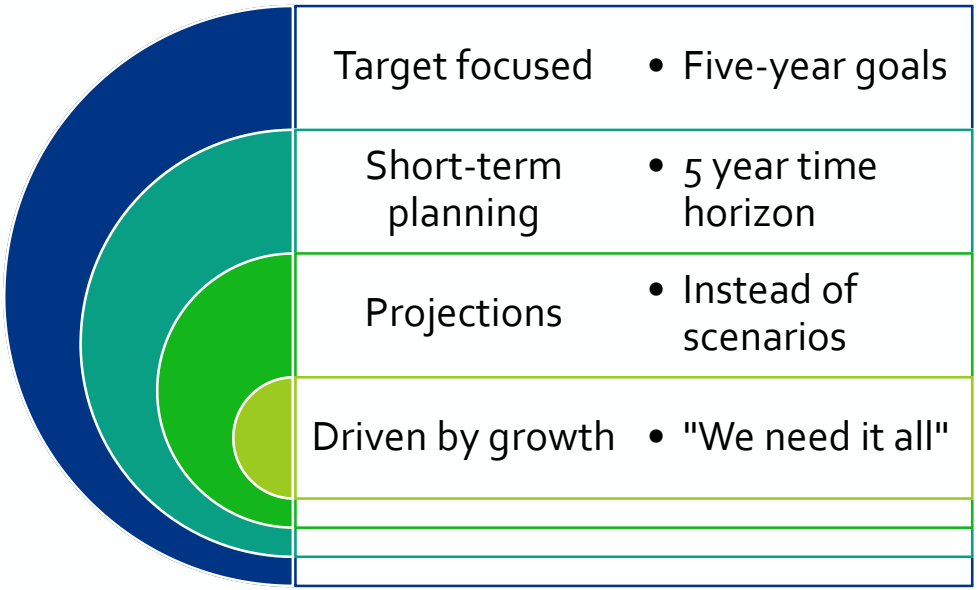
19 Party Congress October 2017

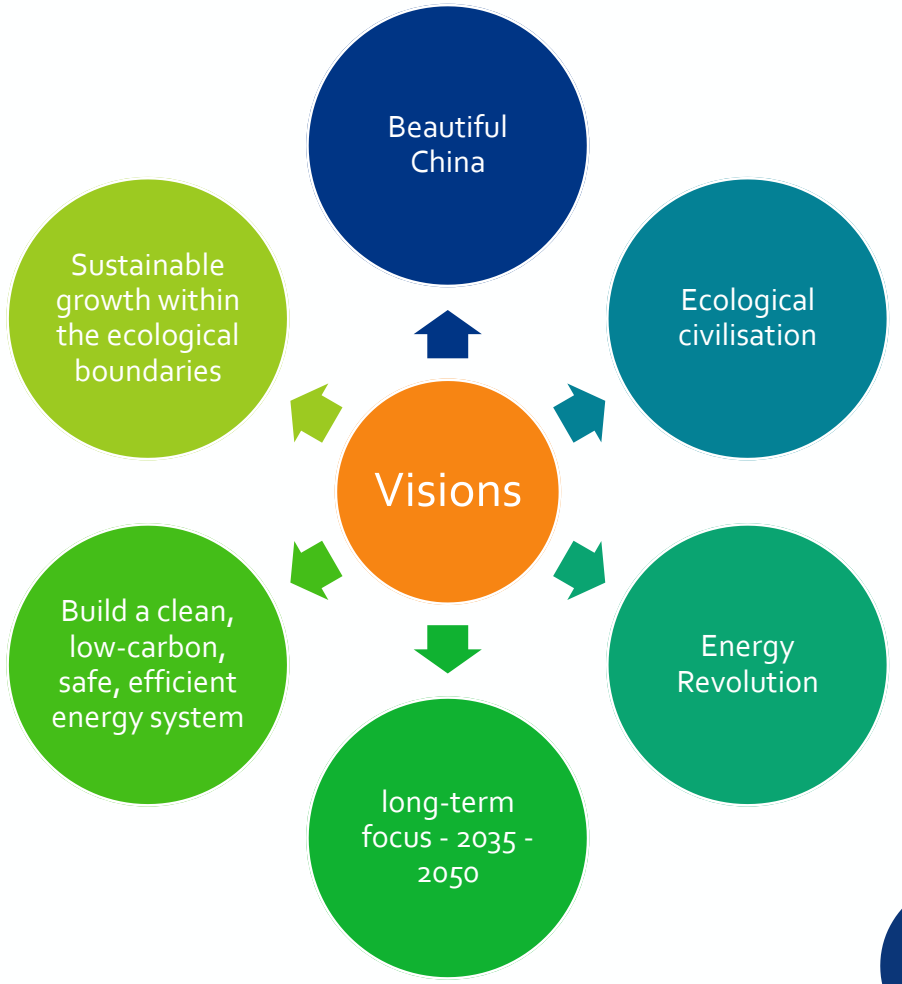
- Clear vision for China 2035 and 2050
- Confirming "Ecological civilisation" as the guiding principle for the development of the society
- Strong focus on coal reduction and clean air action plan

"We will promote a revolution in energy production and consumption, and build an energy sector that is clean, low-carbon, safe, and efficient."

"What we are doing today to build an ecological civilization will benefit generations to come. We should have a strong commitment to socialist ecological civilization and work to develop a new model of modernization with humans developing in harmony with nature. We must do our generation's share to protect the environment."

President Xi Jinping at the 19th National Congress of the Communist Party of China October 18, 2017





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Step 1: Make the vision concrete and detailed

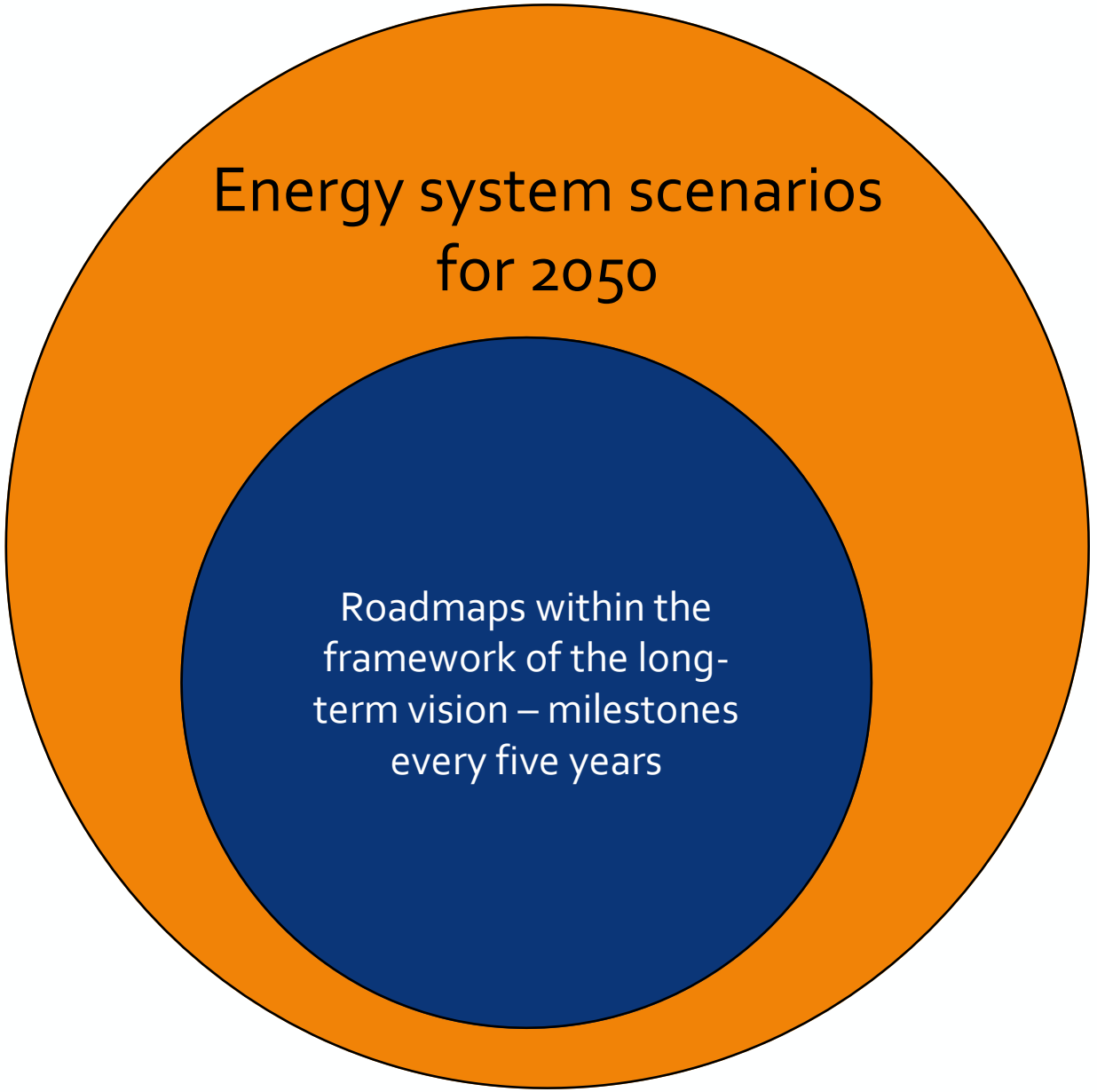
- The whole energy system
- RE integration – detailed dispatch
- Out-of-the-box analyses, but plausible
- Iterations with key stakeholders
- Only a few scenarios

Energy system scenarios for 2050

– demonstrating a clear, low-carbon, safe energy efficient, and cost efficient energy system

Step 2: Develop a roadmap, bridging the current system and the future vision

- Input to the medium term energy strategy



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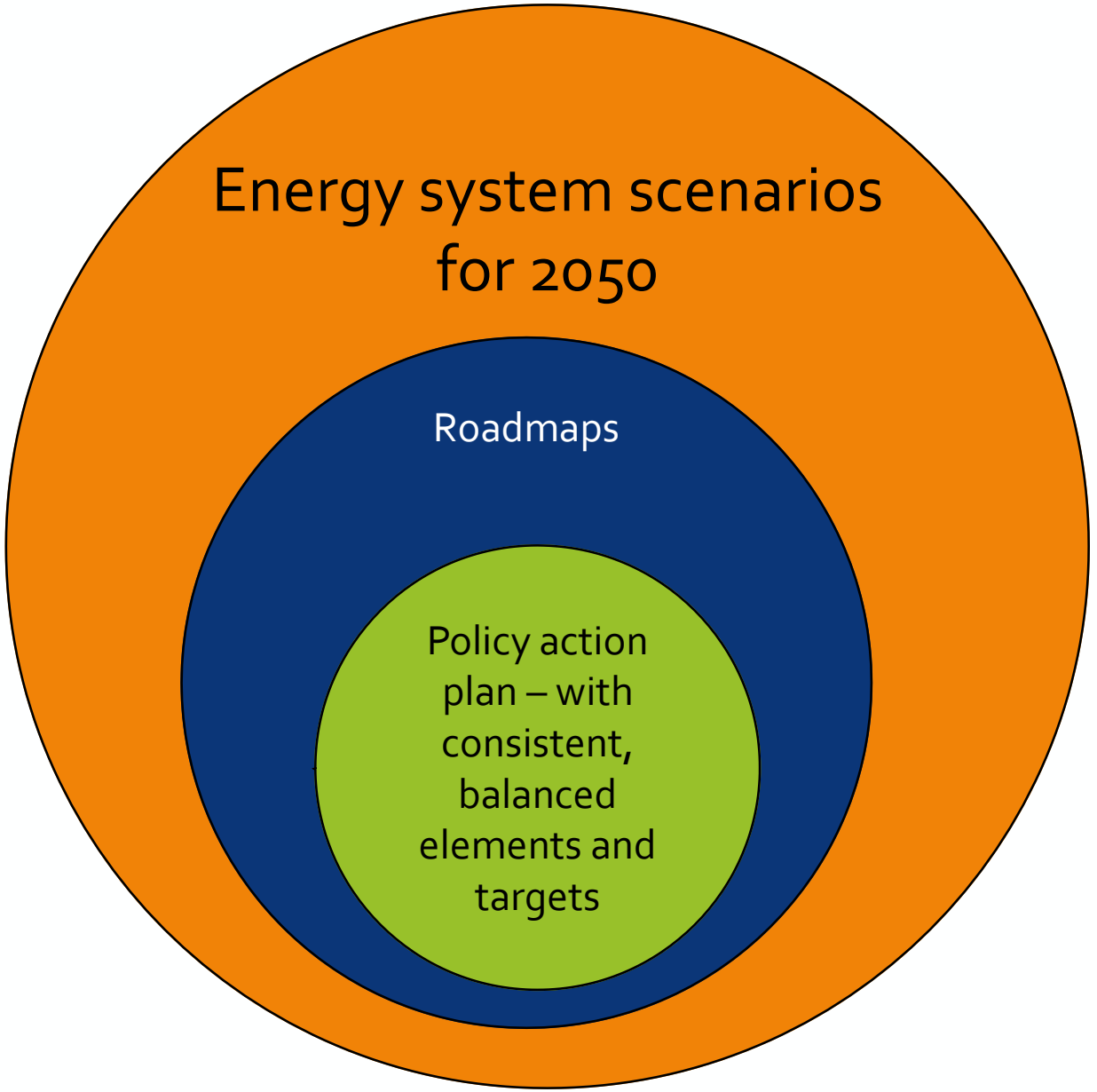
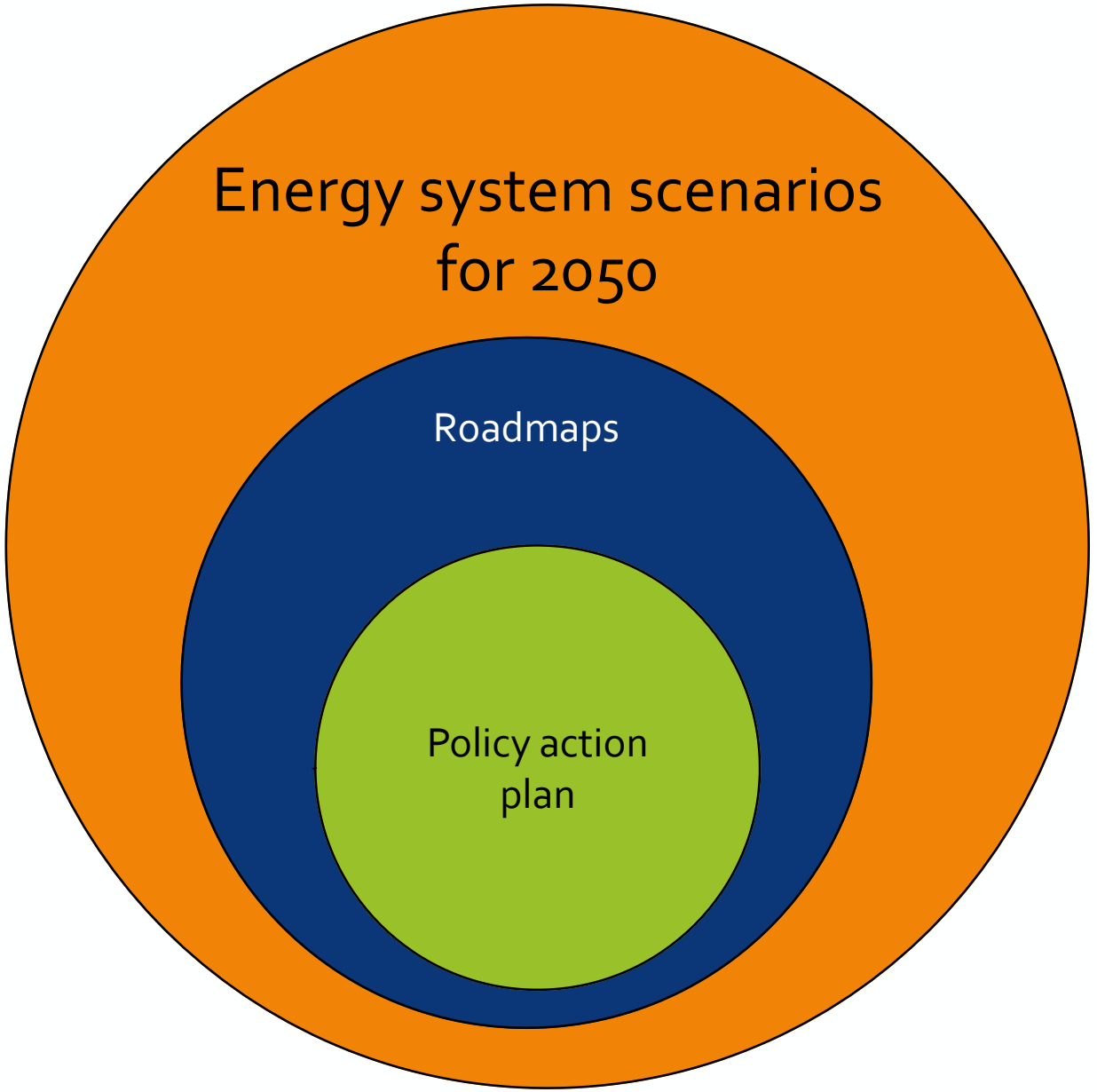
Step 3: Prepare policy actions to support the roadmap implementation

- Input to the next five-year plan



Iterative process

- Iterations with key stakeholders
- Frequent revisions (twice every five-year plan period) to absorb development in technologies, framework conditions etc.



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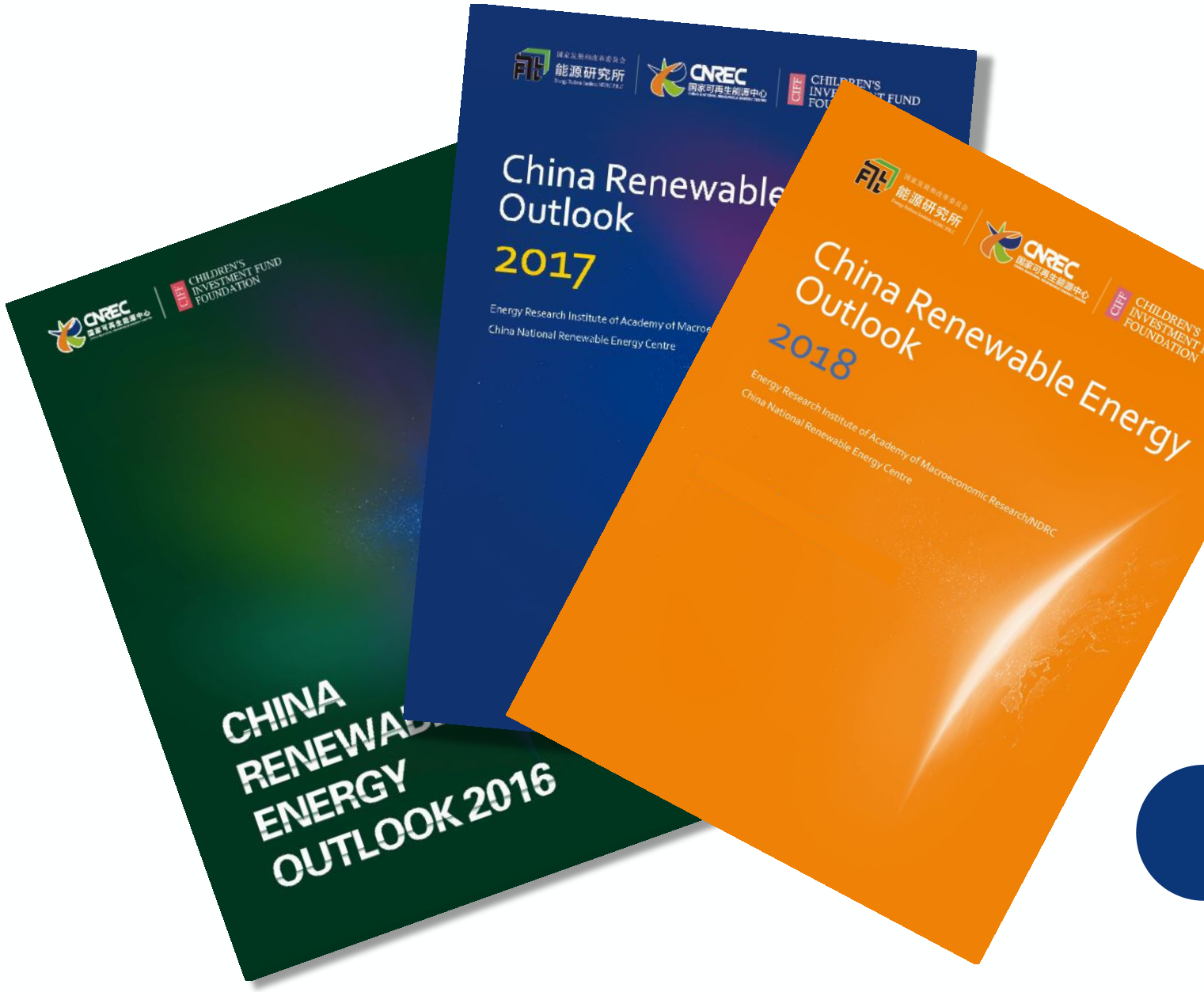
China's energy system towards 2050

Based on multiyear studies and reports for the whole Chinese energy system



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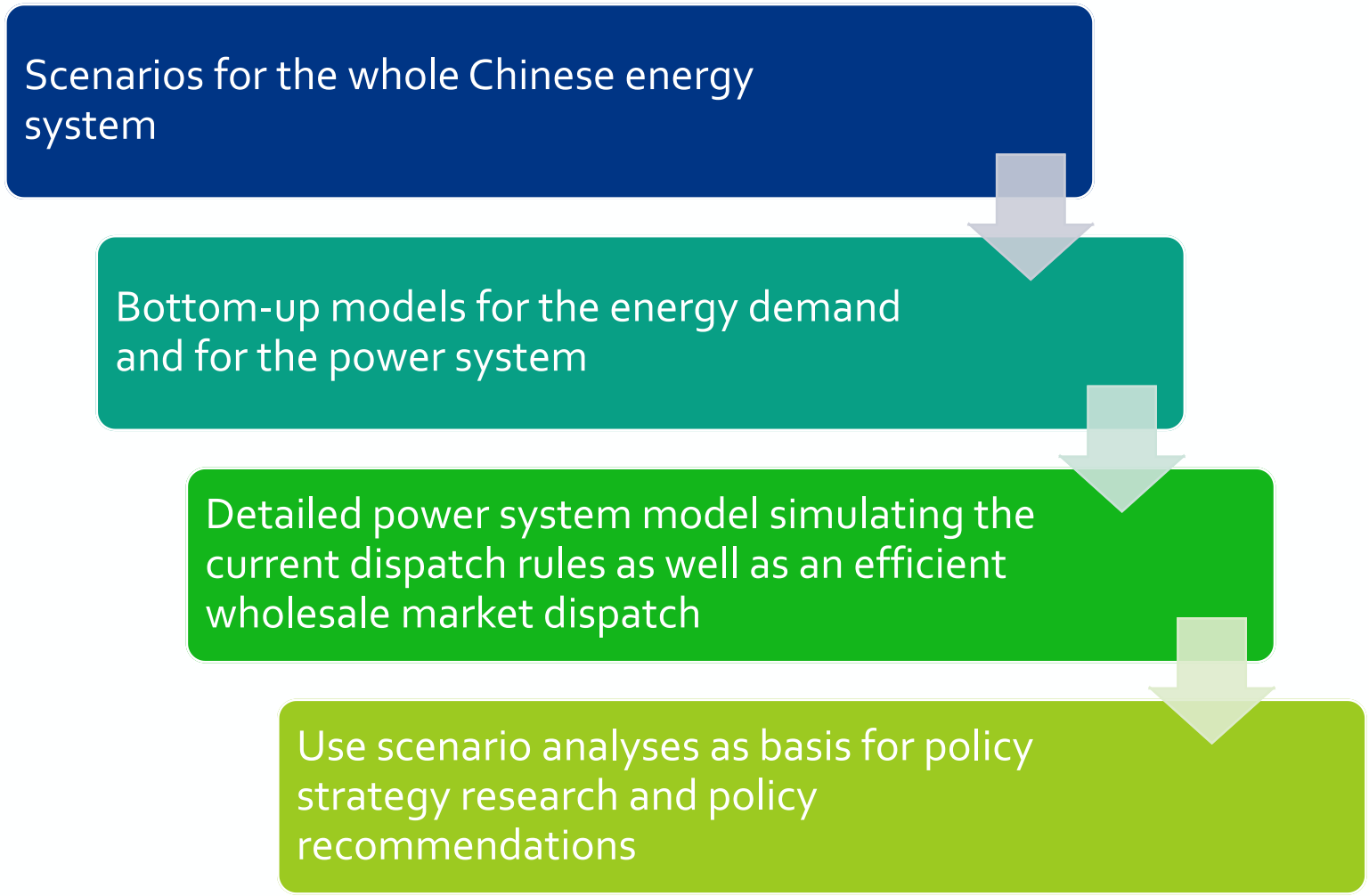
CREO approach

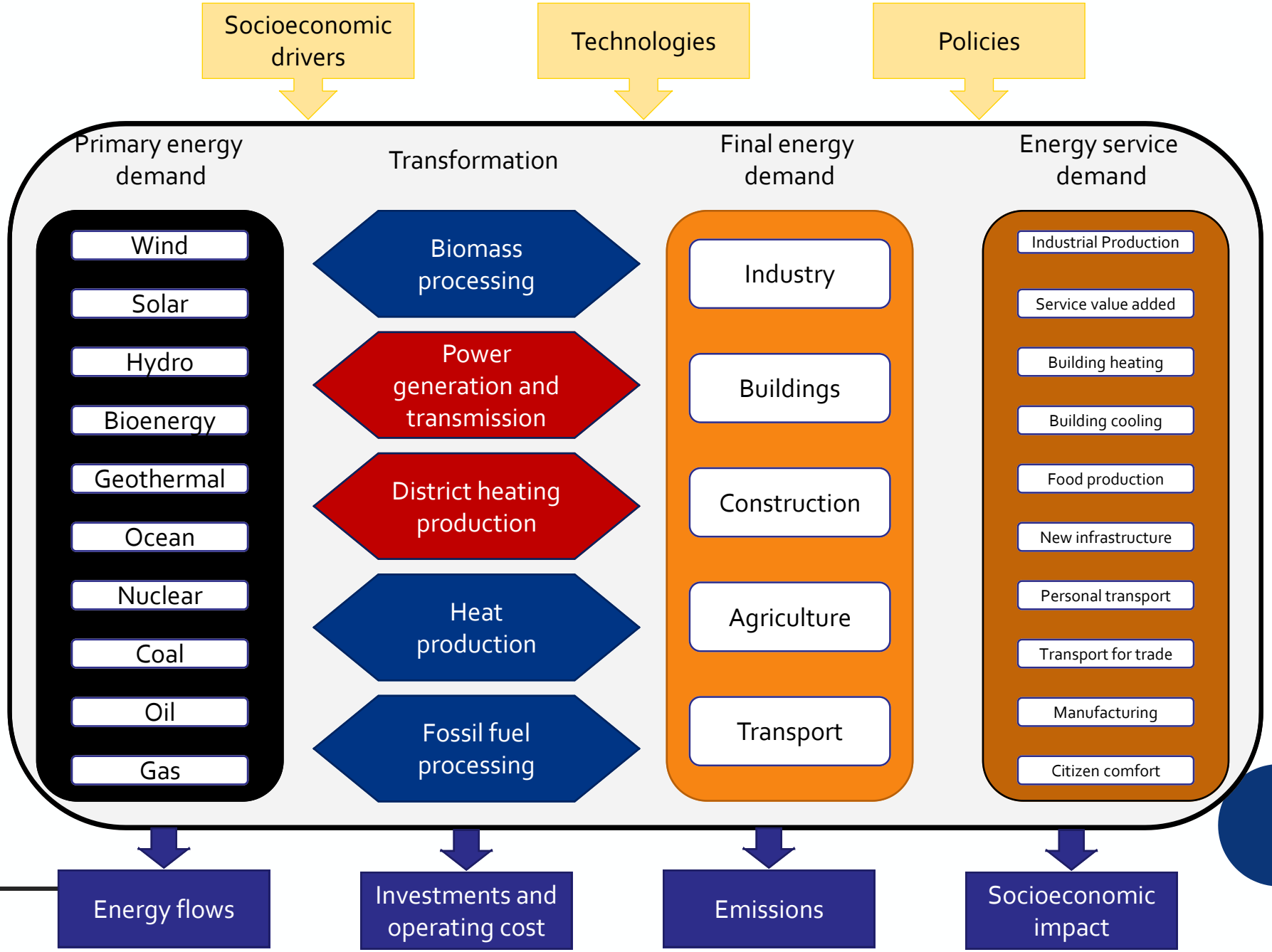
Two main scenarios in CREO

- **Stated Policies scenario,** estimating the energy system development based on current and stated policies
- **Below 2 °C scenario** with added restrictions on CO_2 emission to comply with the Paris agreement goals



Energy system modelling

The scenarios are modelled in the CNREC modelling suite, covering energy supply, energy transformation and end-use sectors.



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Some key findings

- RE becomes the back-bone of the energy system
- Coal phase-out necessary – and beneficial
- Natural gas not necessary as bridging fuel between coal and RE
- Electrification of industry and transport sector a key element in the energy transition

2050 energy consumption

Stated Policies - Below 2°C

Total fossil fuels **1691 - 1038** Mtce

Coal **737 - 387** Mtce

Oil **584 - 487** Mtce

Natural gas **370 - 164** Mtce

Nuclear **341 - 341** Mtce

Total RE **1692 - 2105** Mtce

Hydro **225 - 225** Mtce

Solar **418 - 570** Mtce

Wind **732 - 935** Mtce

Bioenergy **187 - 218** Mtce

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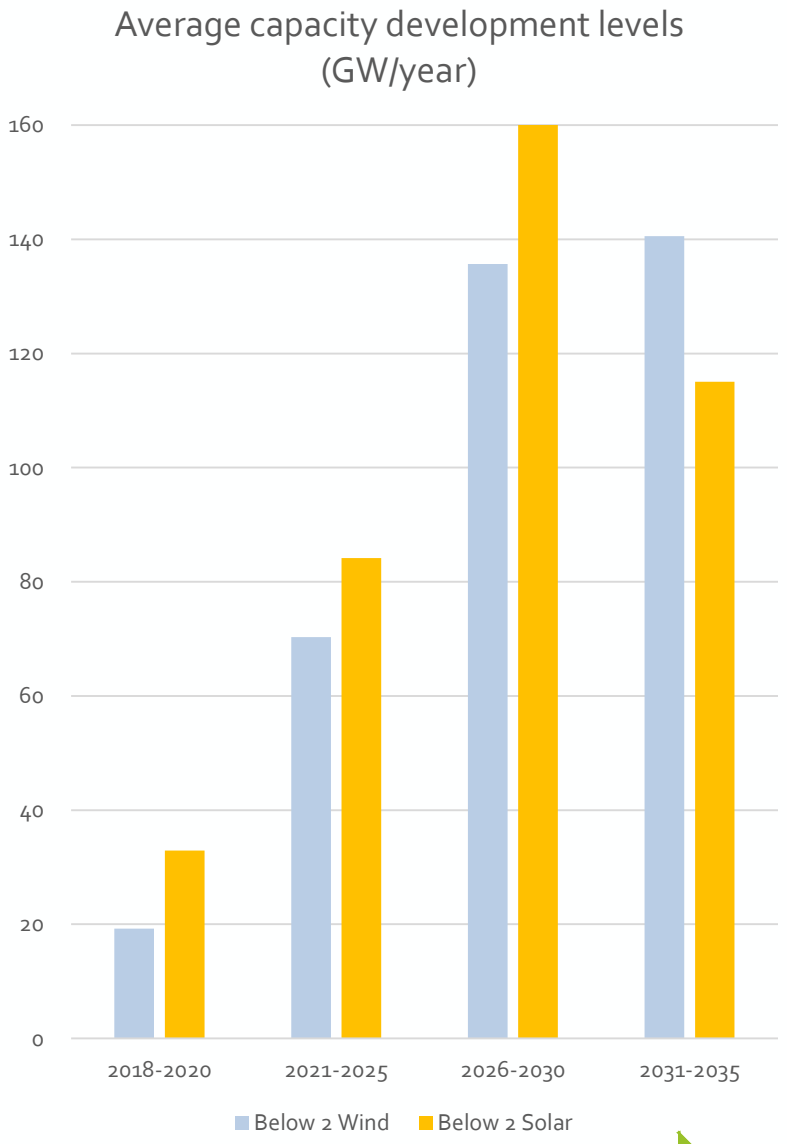
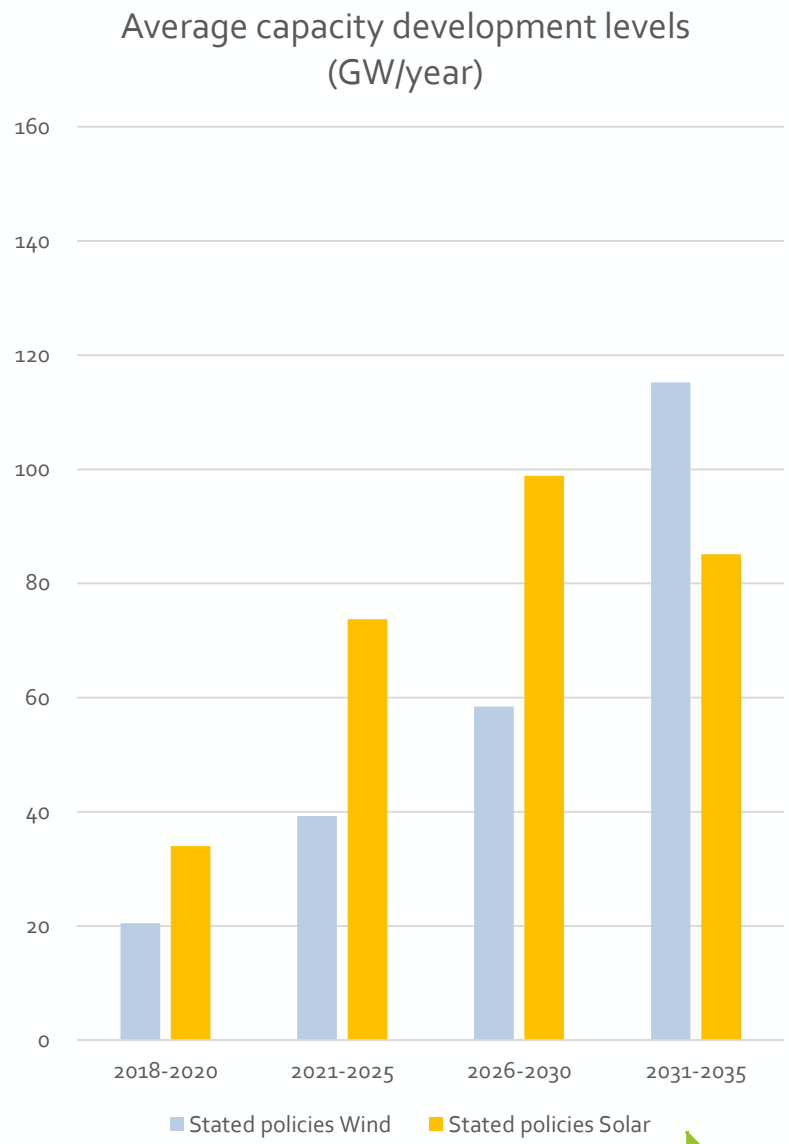
Deployment levels for wind and solar in the 14-16 five-year plan periods

- In the next ten year period, investments in solar power capacity should be raised to a level of 80 GW per year in 2021-2025 and 160 GW per year in 2026-2030. After 2030 the level would be around 115 GW per year
- For wind power, the levels should be around 70 GW per year in 2021-2025 and around 140 GW per year in 2026-2035
- Stated Policies scenario has slower and lower capacity deployment levels





Five-year plans

14, 15, 16

14, 15, 16

EU – China Energy Cooperation Program Joint statement signed 9 Apil 2019

The work stream will include a report on the energy system modelling in the EU and China by relevant research institutions under the steering of the EU-China Energy Cooperation Platform, including analytical and modelling tools, and recommendations to support the modelling capabilities in the EU and China.

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