



A Multilateral Collaboration Program

# Carbon Neutrality and Energy System Transformation (CNEST)

Initiated by: Tsinghua University

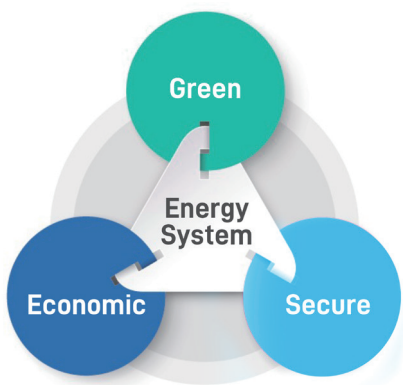


## Background

Climate change is a defining issue of our time. Achieving the goal of carbon neutrality requires the joint efforts of the international community. To date, more than 150 countries have announced carbon neutral or net zero targets.

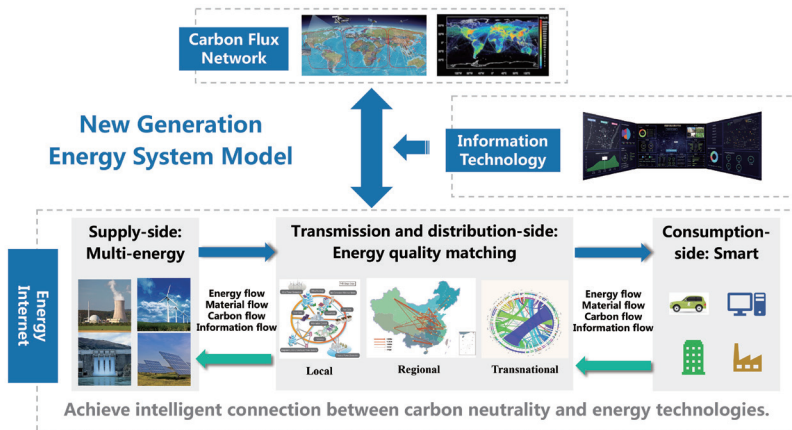
## Major Demand

The development of a system for renewable energy is key to achieving carbon neutrality and sustainable development. Crafting the optimal next-generation energy system includes variables such as energy structure, energy technologies, and other yet-to-be-determined attributes. This addresses the challenge of overcoming the bottleneck of the demand for 'safe, green and economic' energy, constrained by carbon neutrality.

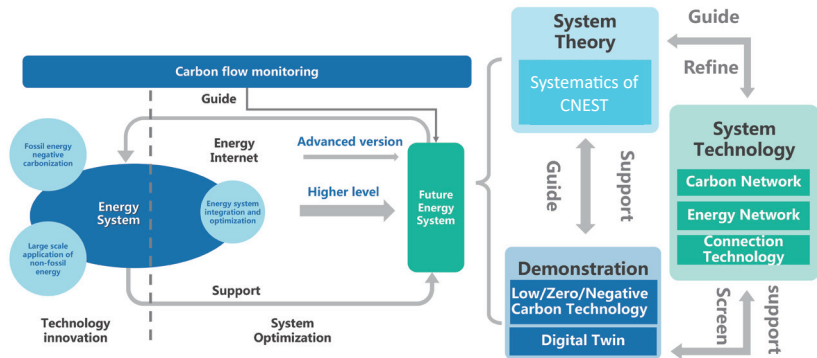


## Innovative Approach: AI for Energy System Transformation

By summarizing the development ideas and plans of carbon-neutral energy systems in different countries, we propose the Carbon Neutrality and Energy System Transformation (CNEST) program. Based on monitoring of global carbon sources and sinks, this approach integrates advanced computing technology and energy network, and aims to optimize the energy system and find the model for a new generation energy system.



## Research Framework



Key elements of the research framework include:

### 1) System Theory:

- Systematics of CNEST

### 2) System Technology:

- Global carbon network
- Future energy network
- Interconnection technology for future energy system

### 3) Demonstration

- Low/zero/negative carbon technology for energy system
- Digital twin for energy system



## Global Collaboration

By bringing together leading universities, enterprises, scientists and engineers, this program aims to foster a collaborative ecosystem dedicated to accelerating progress towards carbon neutrality and the development of future energy system. Scientists worldwide will collaborate across scientific frontiers, from theory to system technology and demonstrations. The pursuit of carbon-neutral technologies, tailored to each nation's context, requires mutual understanding and joint promotion.



## Initiating: Tsinghua University

Initiated in November 2023, this program embodies Tsinghua's vision and commitment to catalyzing change toward a future energy system. With solid and wide research foundations and collaborations, this program aims to unite global efforts in supplying illuminating ideas and technology demonstrations of the future energy system and contribute to the global realization of carbon neutrality.

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