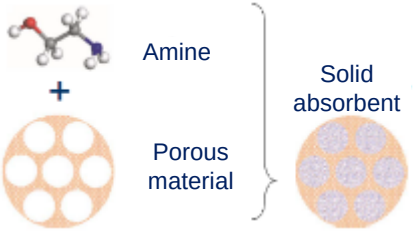
Development of Technology for CO_2 Separation, Capture, etc. (Amount covered by the government: Up to 38.23 billion yen)

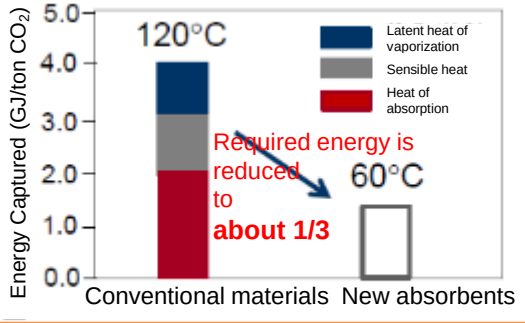
- In order to make the **power sector** and **heat demand** carbon neutral, it is necessary to **respond with "CO_2 capturing."**
- The core of CO_2 capturing is CO_2 separation and capture technology. It is a **fundamental technology essential** for **carbon recycling**/CCUS of synthetic fuels, chemicals, concrete and other products that use CO_2 as raw material.
  Japan **has the top market share** of commercialized **plants for separation and capture of high-concentration CO_2 from coal-fired power and other facilities**.
- The future **challenge is to reduce the energy and costs** required for separating and capturing CO_2, in order to **apply CO_2 capturing to the gas with lower concentration (10% or less) generated from natural gas-fired power plants and factories** that have not implemented CO_2 capturing.
- The project will promote the **development of innovative materials*** that can separate CO_2 with low energy costs and **the innovation in and demonstration of system technology** to reduce the costs that are currently 6,000-7,000 yen per ton to **less than 3000 yen per ton by 2030**.
  *Amine absorbents, physical adsorbents, separation membranes, etc.
  In addition, it aims to establish a technological base for evaluating the standards of separation materials that use actual emitted gas, thereby strengthening the international competitiveness of Japanese companies.

An example of amine absorption for commercial use
Mitsubishi Heavy Industries Engineering (Petra Nova [U.S.])

- World's largest flue gas treatment plant at a coal fired power plant (4,776 tons/day)
- Their proprietary amine absorbing liquid, KS-1™ designed to save energy by integrating steam and electricity

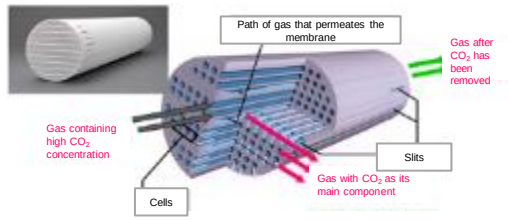
Example of a new amine absorbent being developed





Example of development of a new separation membrane

- Progress is being made on **developing a separation membrane from various materials** such as ceramics, porous carbon fibers and polymers.
- Among **Japan's advantages** are **the world's largest ceramic separation membrane** and **the molecular gate function membrane which selectively filters CO_2**.



Zeolite membrane (example)