

○ Question:

**-Can car keep a main player in future society,
judging from life (health) , energy, environment and business ?**

○ Basic concept

- What is a transporter superior to Hybrid, EV, and PHV cars ?
- How can we save money and time to compensate weight gain and muscle loss caused by constantly relying on car for transportation ?
- Assist warming up from inside the body instead of energy consuming electric heater to overcome a serious weak point of EV in cold areas
- Heat is a lower grade energy, since it inevitably accompanies loss in conversion.

→ Multi-brid car assisted with man power

○ Design concept of car innovation

- Renewable energy
- Implementation of health care units with sensing devices and athletic functions that can work also at emergency
- Drive with hands only and let feet free for physical training:
Add athletic room function to driving car.

A new concept car for sustainable development and health

- **Gymnastic EV: Multi-brid car-**

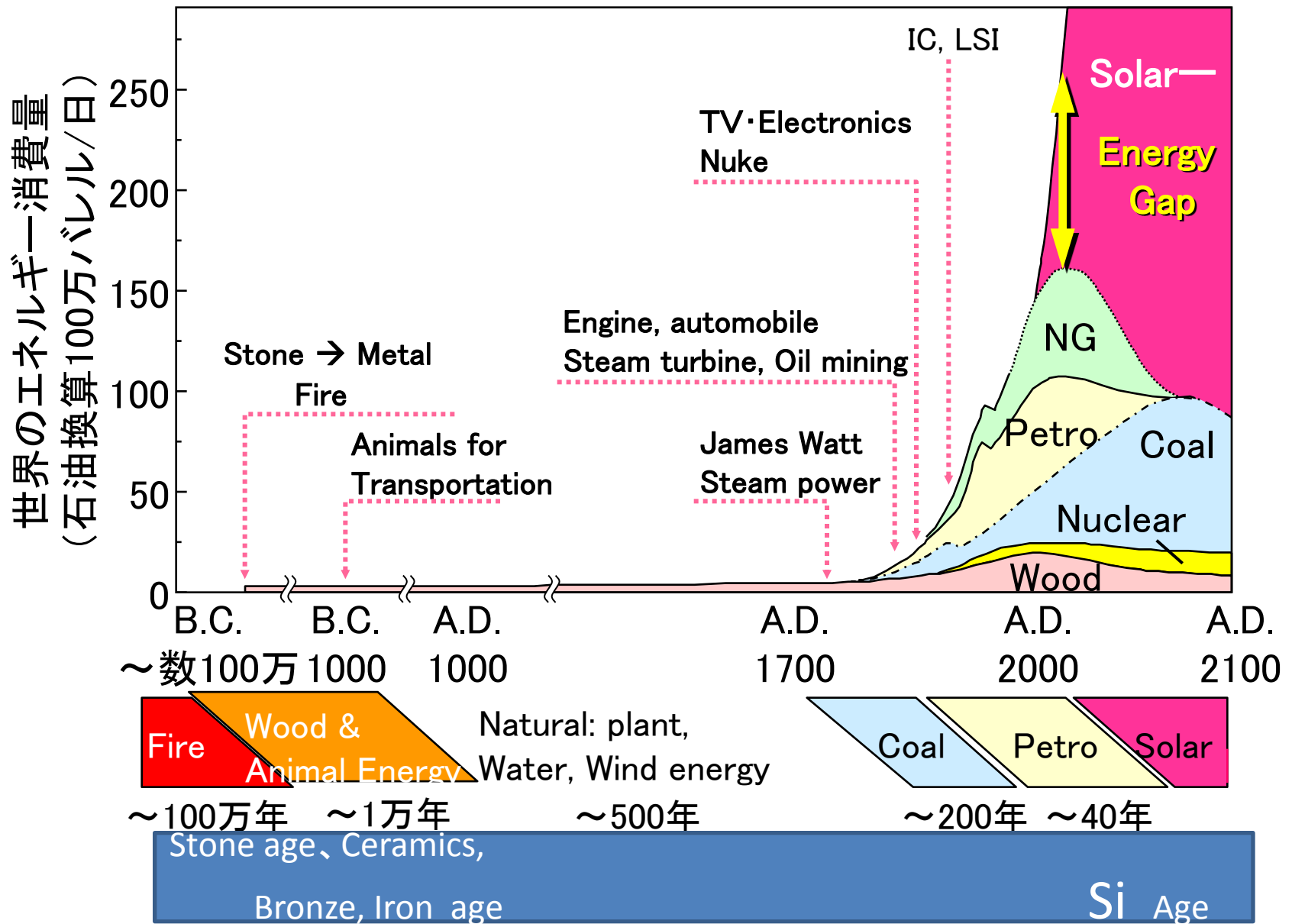
H. Koinuma

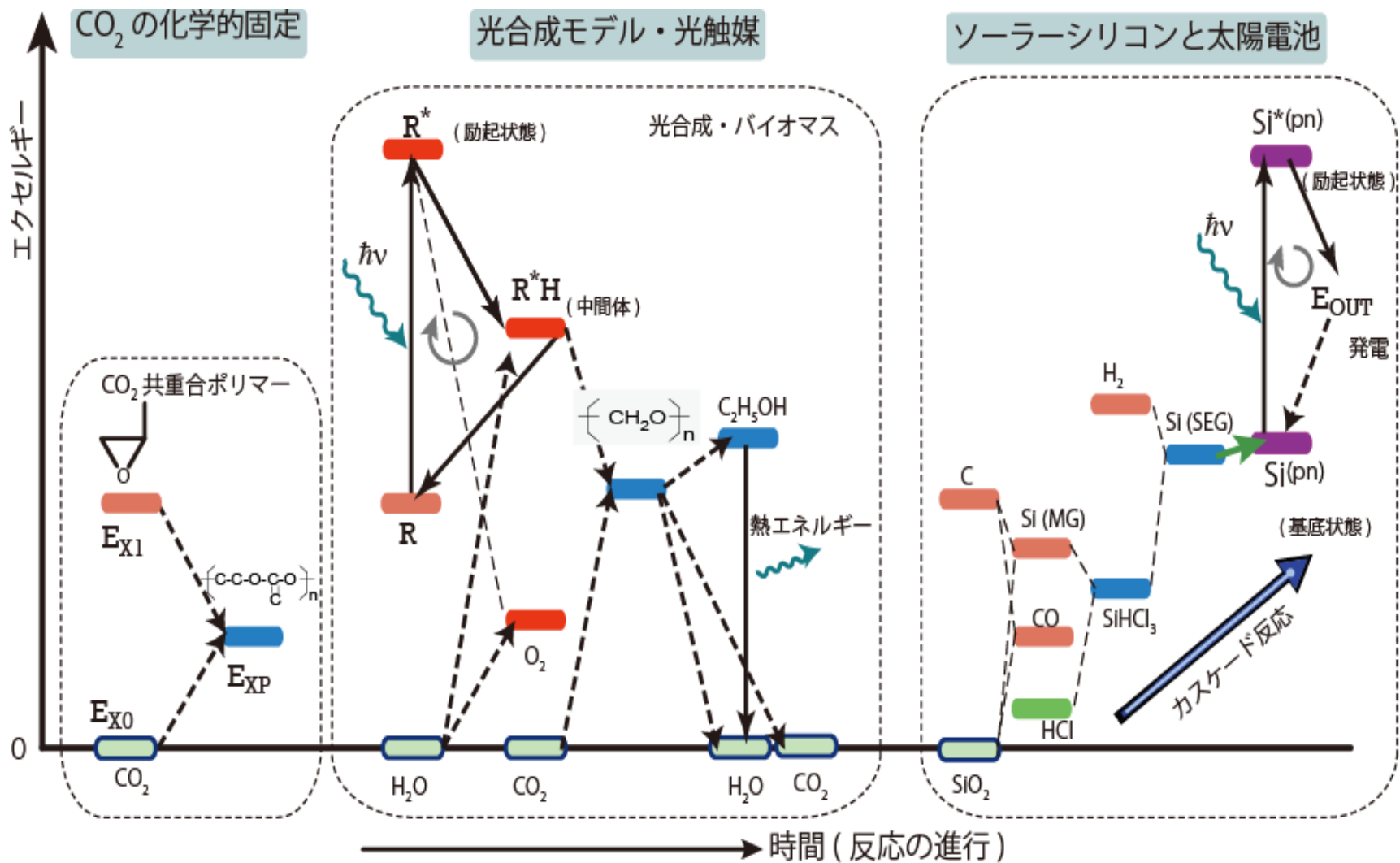
Niche of Tohoku Univ., Frontier of Tokyo Univ. and ARENA of Tsukuba Univ.

- Energy and civilization
- A new energy project for sustainable development :Sahara Solar Breeder (SSB)
- The basic idea and framework of Multi-brid EV
- Electricity assisted bicycle and human power
- Advantage and disadvantage of EV
- Structure of MB-EV: EV + athletic machine + health care
- Initiative application: Multi-brid cart

Human History vs. Energy source and material

The sun is constantly supplying energy on the earth 10,000 times more than we are getting from fossil and nuclear fuels





Oxides as stem material for sustainability

Effective energy under terrestrial conditions = Exergy value

$$Ex = \Delta G + (1 - T_l/T_h) T \Delta S$$

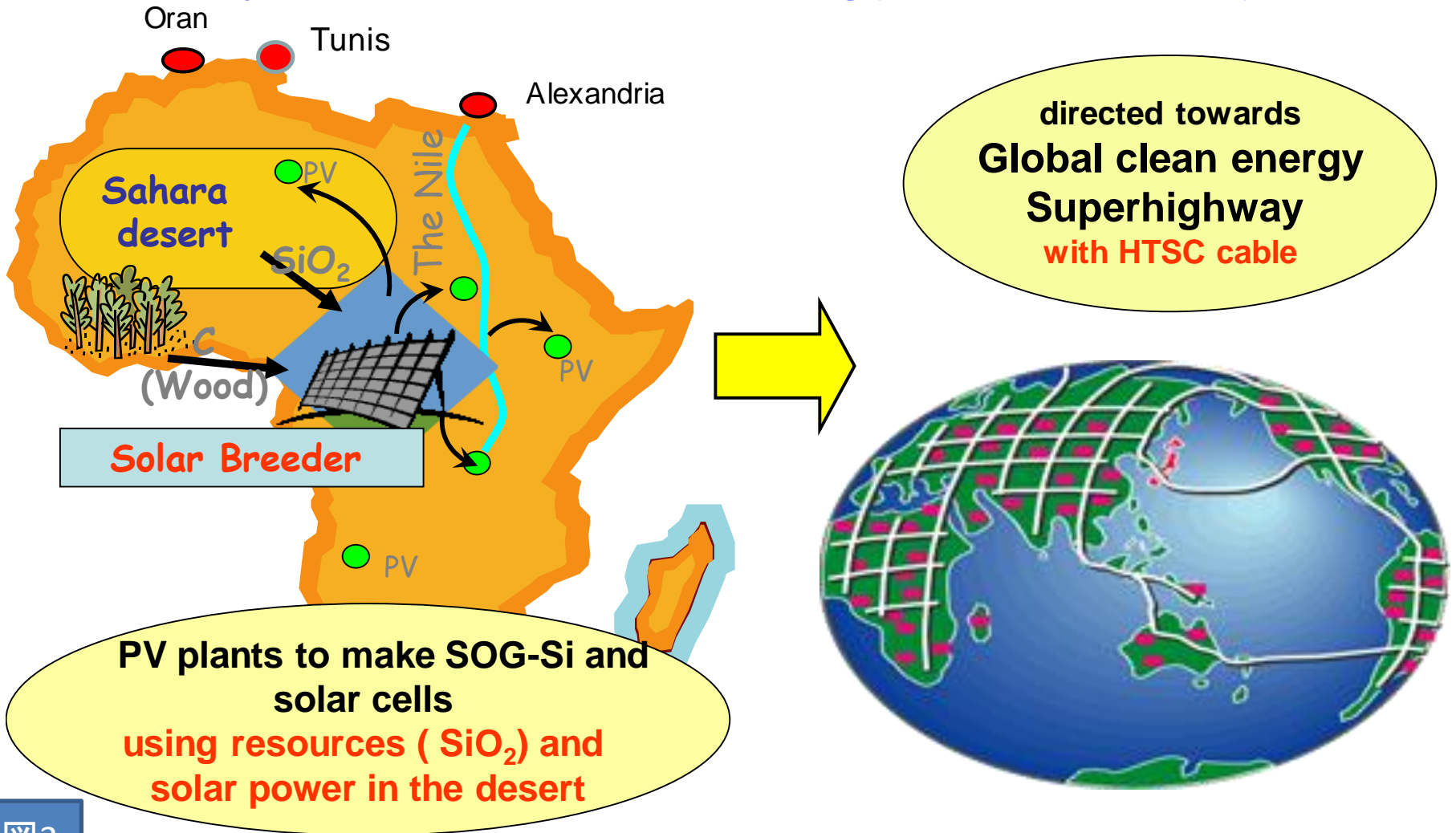
Photo synthesis: vitally important, but energy conversion efficiency is low.

CCS (Carbon Capture and Storage): Just crazy ? → **What is more clever ?**

Sahara Solar Breeder (SSB) Plan

directed towards global clean energy superhighway

-SCJ Proposal @ G8+5 Academies' meeting (Rome, Mar.26, 2009)-

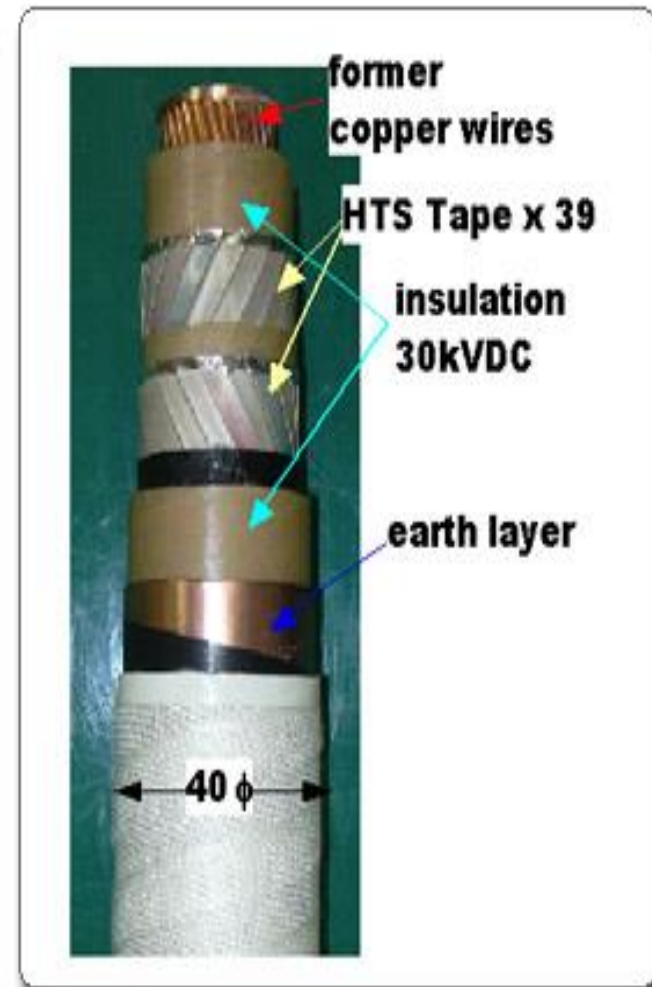
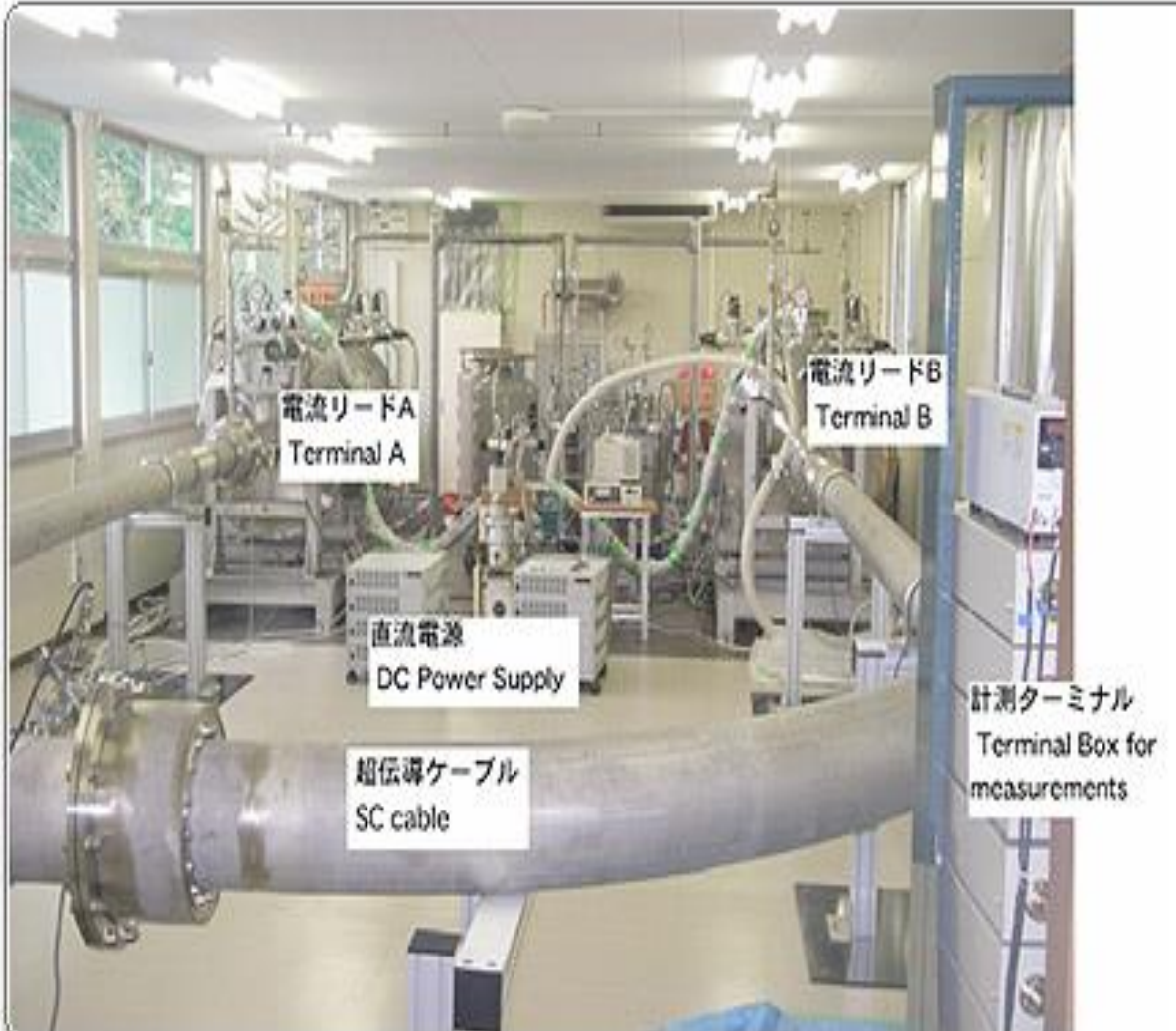


Start from 2MW (Si 10t/yr) to breed into 100GW PV in 30 years

→ 100 such breeders can supply > 30 % energy demand via HTSC cables

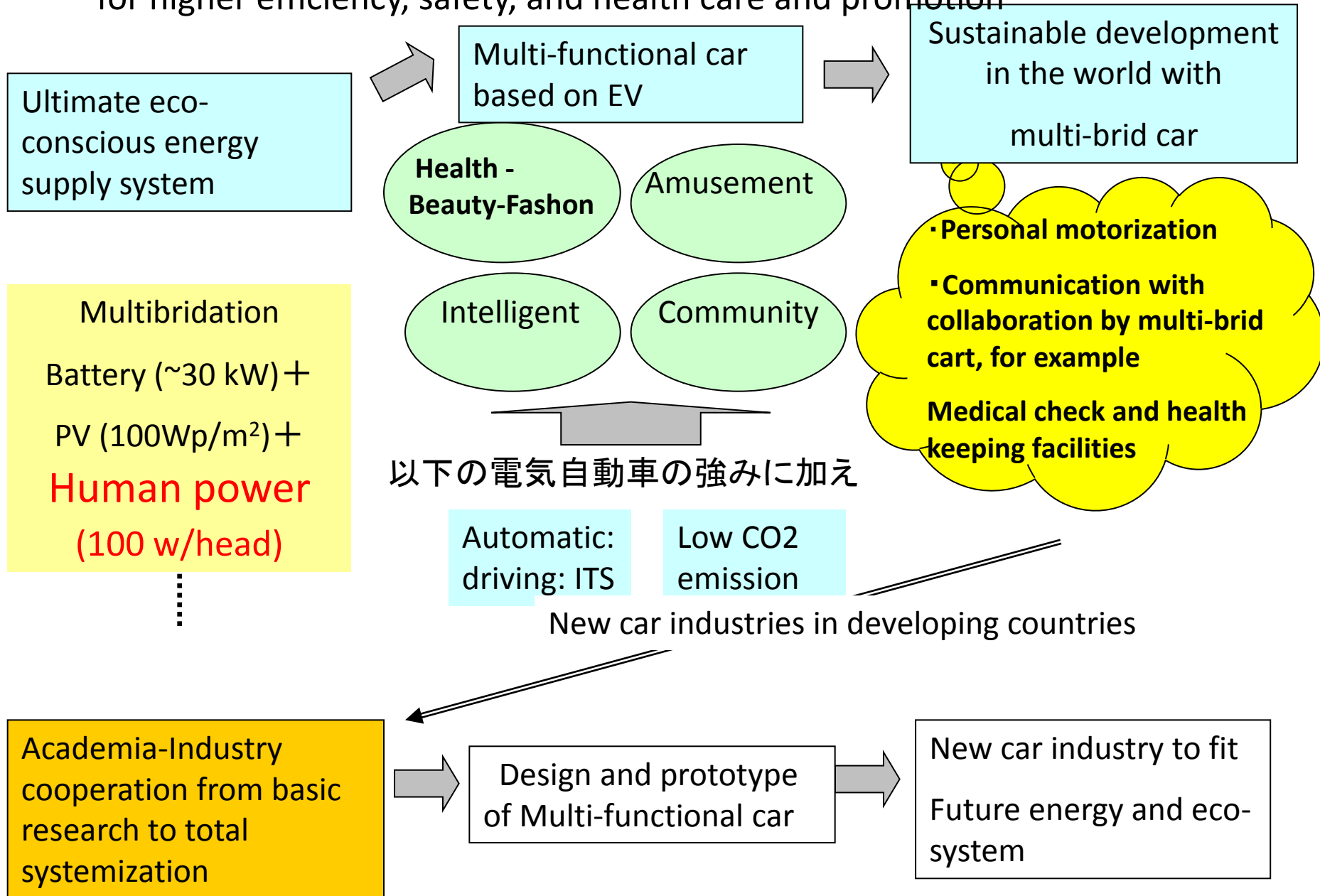
図3. 高温超伝導ケーブル(右:住友電工製)による直流送電システム研究施設(左:中部大学)

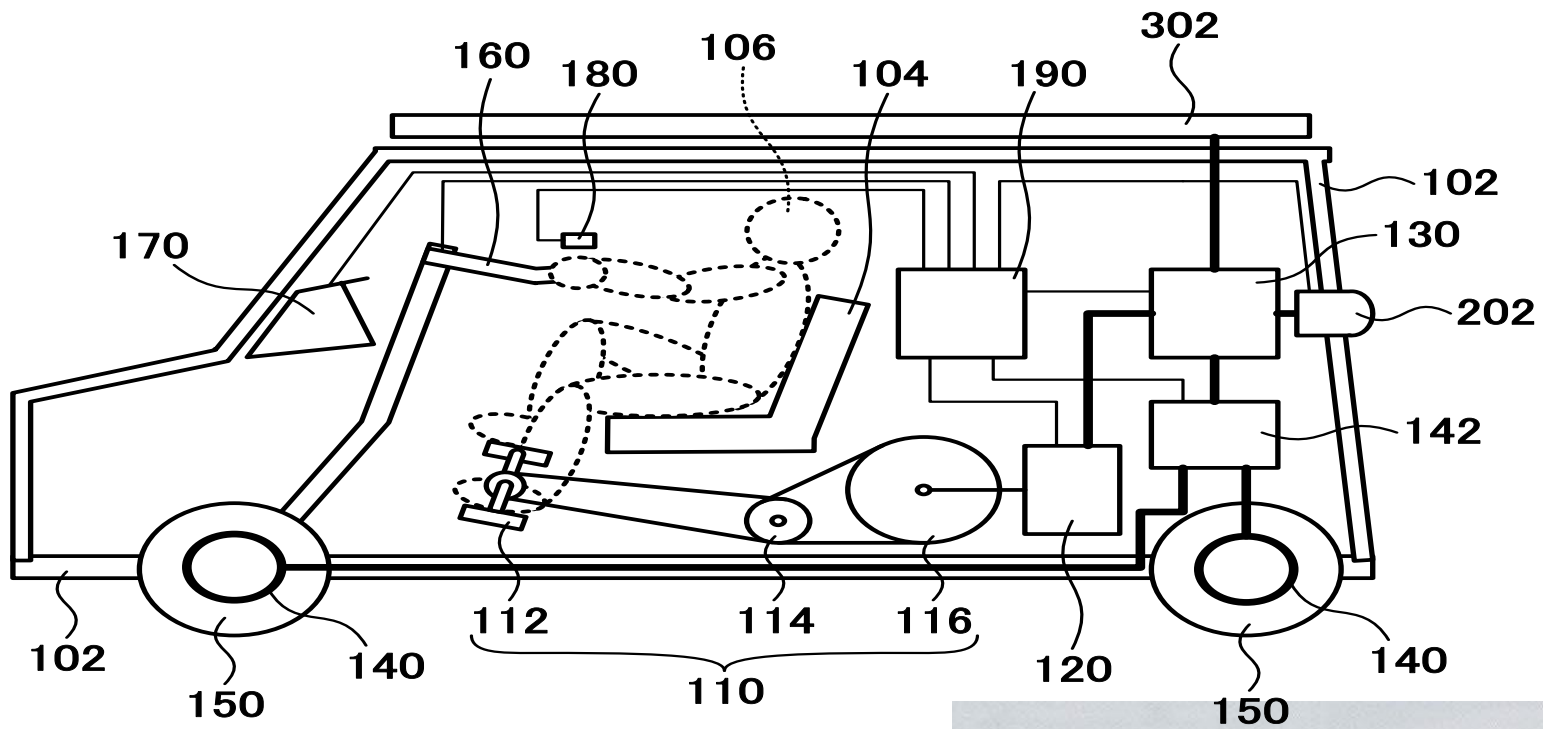
液体窒素冷却した4cm径ケーブルで約700MVAの送電ができる
(通常のCu線では14cm径のケーブル3本を2-3m径のトンネルに格納する必要)



Roadmap to smart car by multi-energy supply system

for higher efficiency, safety, and health care and promotion





300

H,K, et al., JP Patent Application

竹井機器工業
Brochure



Multi-brid car (MBC)

**** *New concept car equipped with health care and athletic gym function.** ****

Why ? EV has a serious weak point for deployment in cold local areas, if the air-conditioning, especially heating, is driven by the battery.

What is MBC ? Man power is not so big (100~600 W), but it can help not only battery charging but also warm up his body from inside.

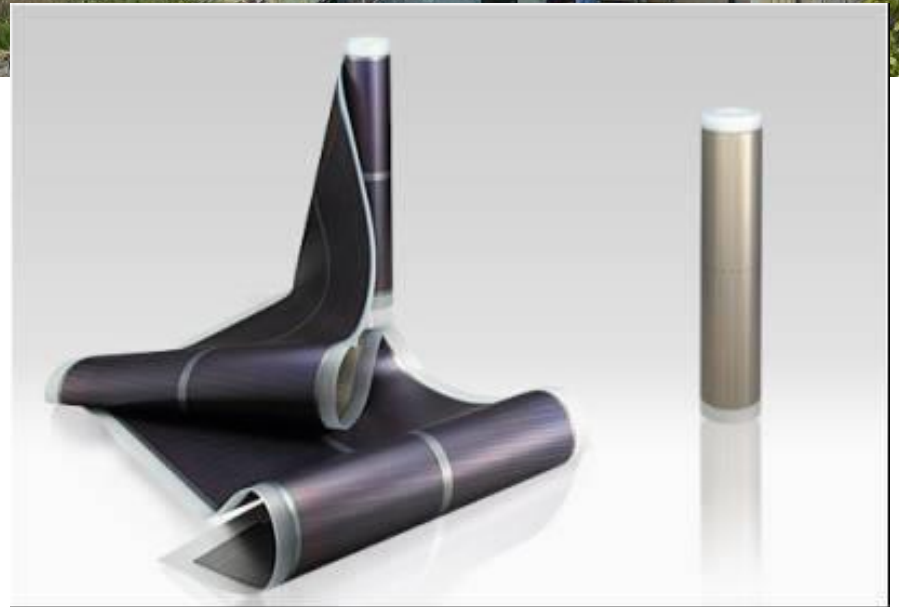
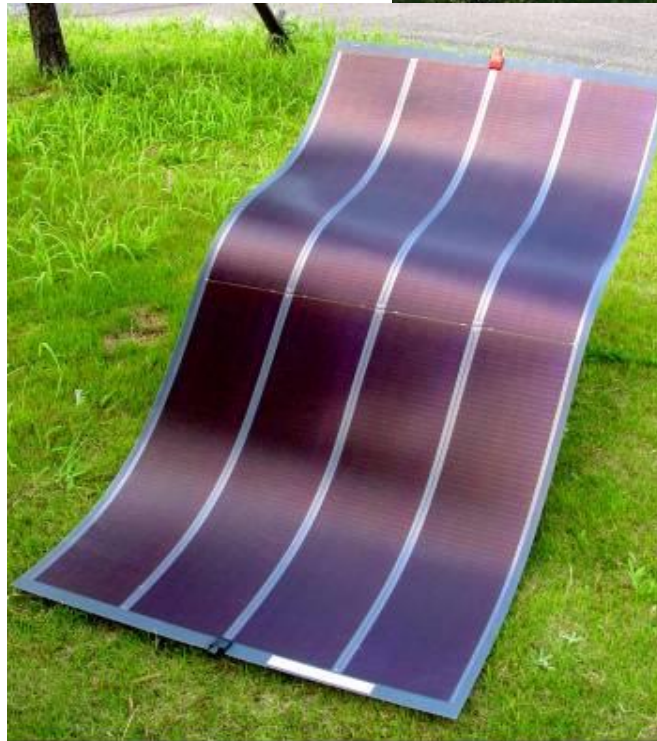
How, who, where, and when ? Install bicycle-type electric power generator at driver's and passengers' seats. People can work and relax as they like under monitoring their health care sensors.

Thus, automobile can be an athletic room, in addition to transportation tool.



Fig. 1 Bicycle type human power electric generator : 200 ~600 W

Flexible solar cell: PV on plastic film (PI, Pen, etc. or metal foil)



Thank you for your attention

