

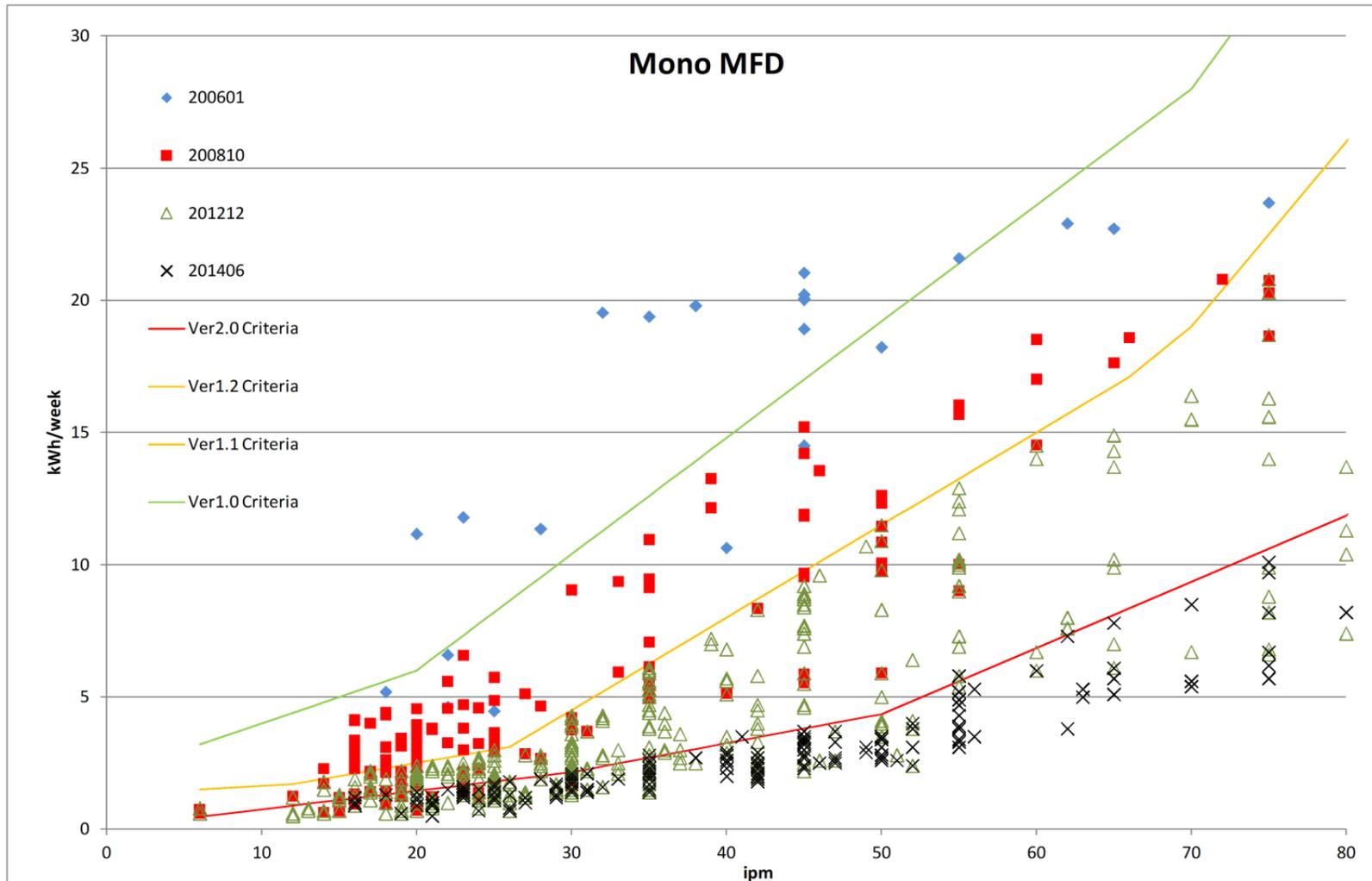
**Request to Imaging Equipment
Standard criteria on next version
about EP products**

JBMIA Copier-MFD Technology WG

JEITA Printer Energy Saving WG

Improvement Overview from Ver1.0 to Ver2.0

Criteria have been revised twice, actual TEC values greatly improved. Particularly Ver2.0 criteria are so severe for monochrome products that further improvement is hardly possible.



Technical limit of EP method

TEC measurement pattern

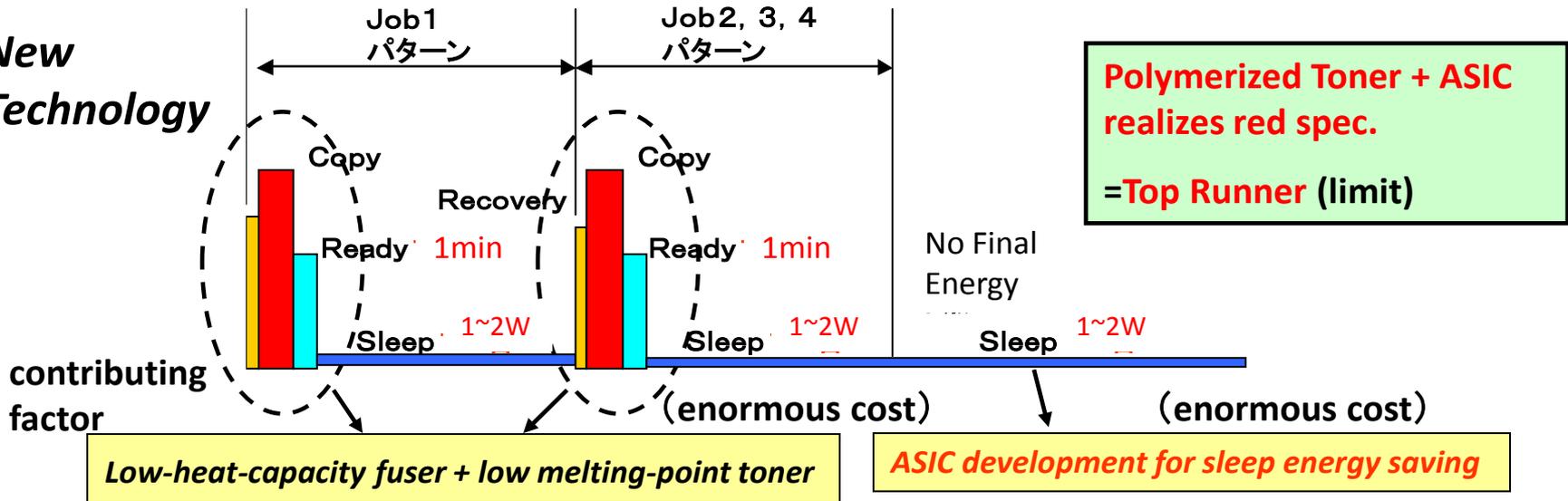
Old technology

Always pre-heat required

Job Energy
+ ready Energy

Job1 pattern	Job2/3/4 pattern
once for morning /noon	6~30 times according to ipm
	Twice/day

New Technology

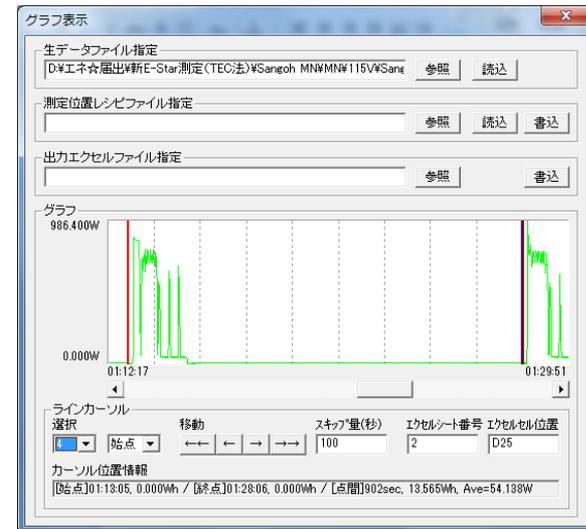
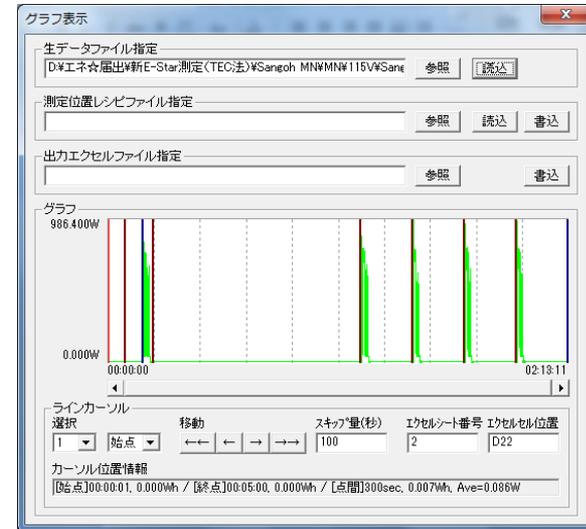
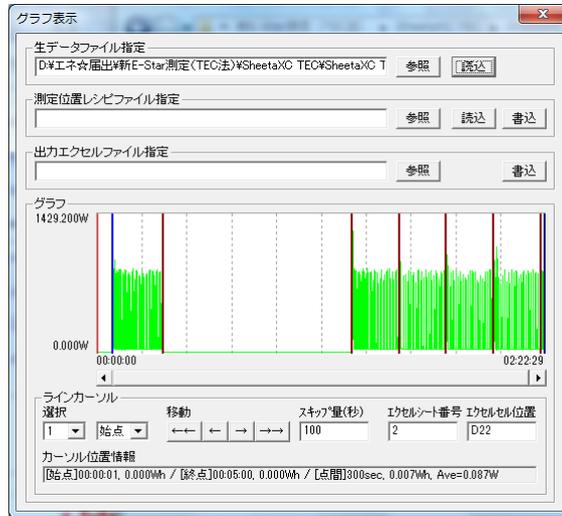


(Proprietary tech: polymerized toner / crashed small-diameter toner)

(Needs customization for each model; no common tech.)

Technical approach of TEC improvement

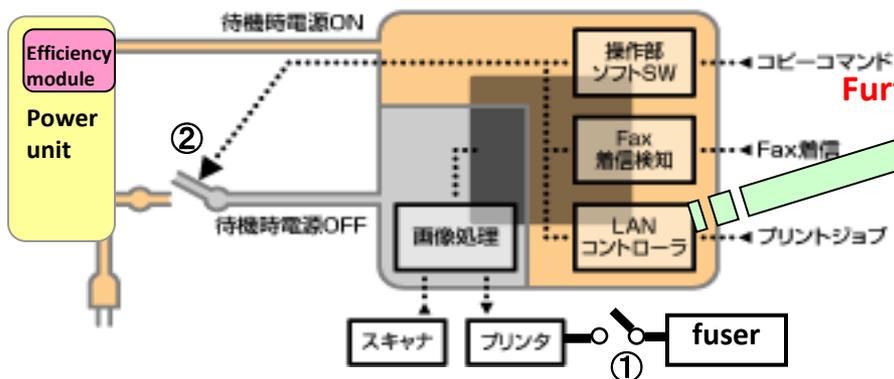
Actual picture image of TEC testing data corresponding to illustrations on the previous page.



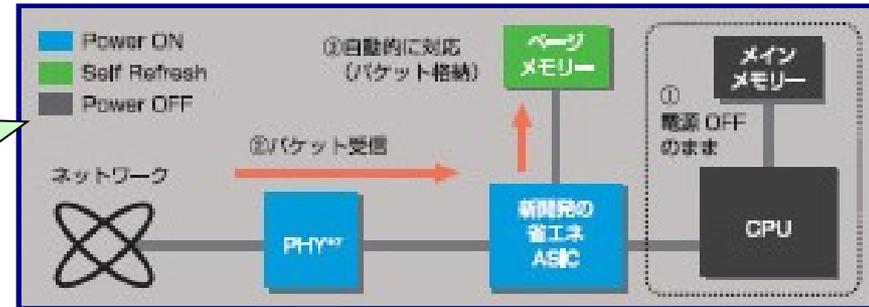
History of power reduction in Sleep mode

1. Power off of non-active area

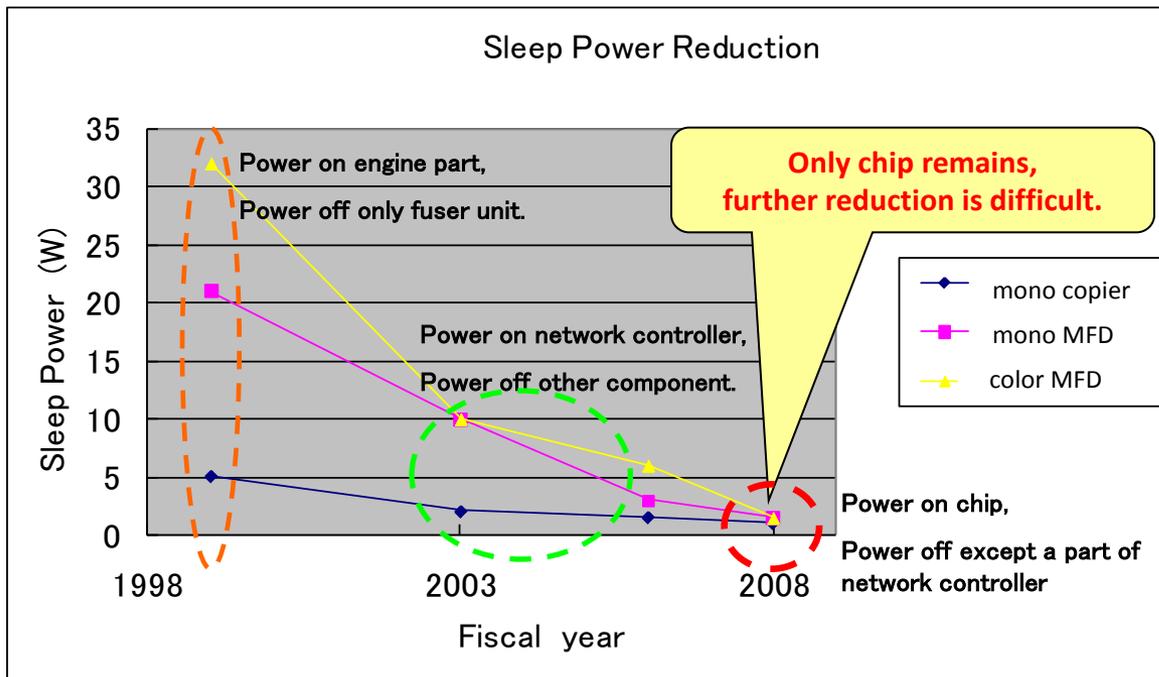
2. Main CPU off (separation of LAN connection)



- ① Power off only for fuser unit
- ② Power off for other units, other than network controller



③ Separation of network-connection-function from high-speed main CPU, which consumes significant power, by way of network-control LSI, realizing energy-saving.



◆ Technical hurdle

- ASIC development – resource investment
- Retarded recovery time – system initialization
- Efficiency of power unit – high efficiency for low power output

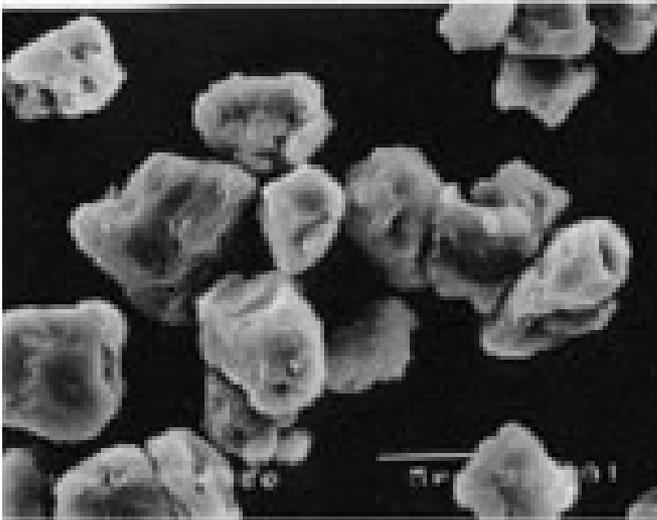
In these ten years Sleep power has been improved greatly. After achieving ~1W, there is no other power source, meaning this is the limit.

**Lowering toner melting temperature
(example)**

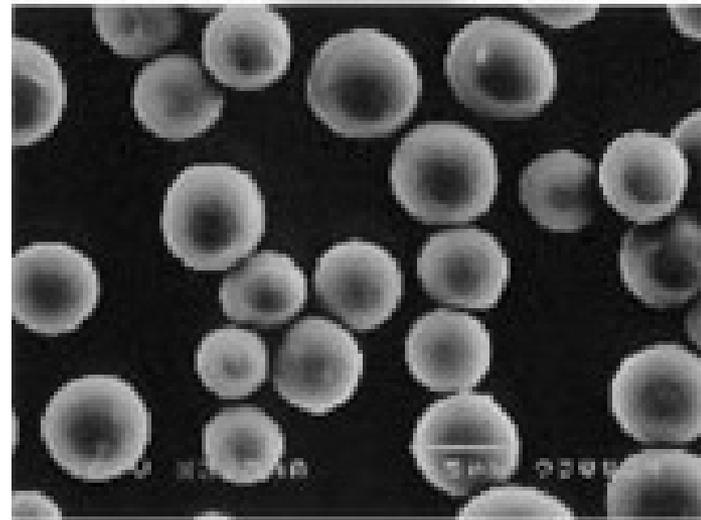


**Big improvement in
manufacturing method (break
through)**

Crash toner (conventional toner)



Emulsion polymerization (capsule toner)



smaller particle diameter

improvement of diameter distribution

(remove too big / too small particles)

Lowering toner melting temperature

Toner viscosity change vs. temperature

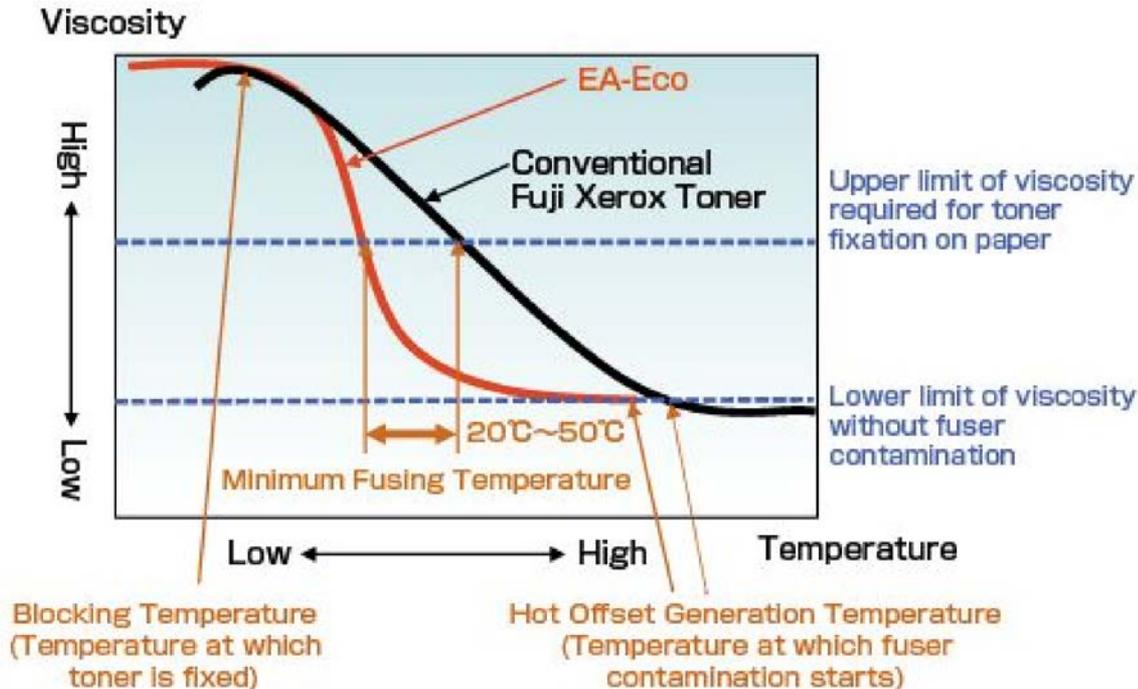


Fig. 1: Viscosity Changes of EA-Eco Toner with Temperature

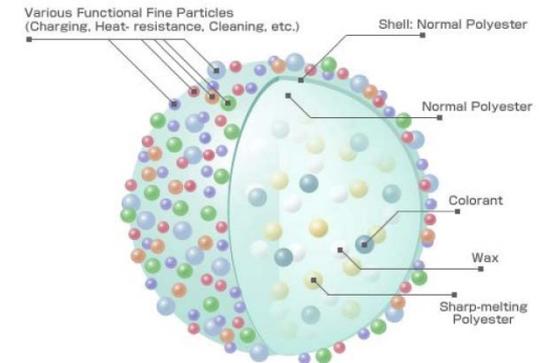
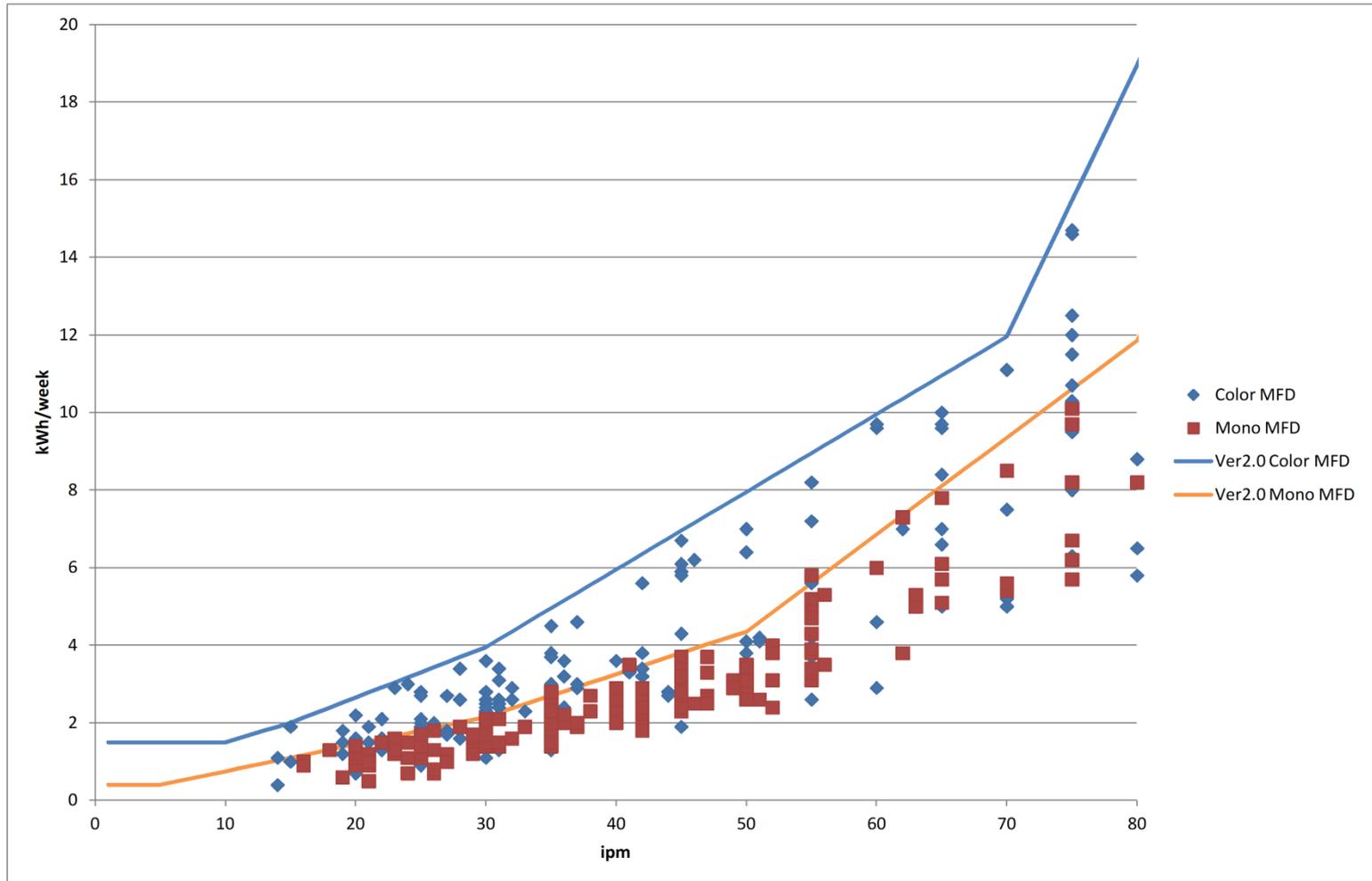


Fig. 2: EA-Eco Toner Structure

EA-Eco toner with an abrupt change of viscosity against temperature lowers the minimum fusing temperature by 20~50 degrees centigrade. However, this needs enormous investment on production plant etc.

Distribution of MFD TEC data

After introducing technologies shown in the preceding pages, the top TEC values of monochrome and color products stay almost at the same level. This shows that EP method has encountered its technological limit.



Summary

Success!

ENERGY STAR has driven tremendous energy savings!

Concern

For top-runner products; there's no where to go, but these are now very efficient products.

END