COOPER Power Systems

2010 Efficiency Standard

- Became effective January 1, 2010.
- Spans from 10kVA (single-phase) to 2500kVA (three-phase).
- Approximately 30% reduction in losses.
- Average of 20% higher cost and larger/heavier.
- 7.4 to 15.6 year payback per DOE analysis.
- All current manufacturers able to meet DOE standards by using higher grades and larger quantities of core steel.

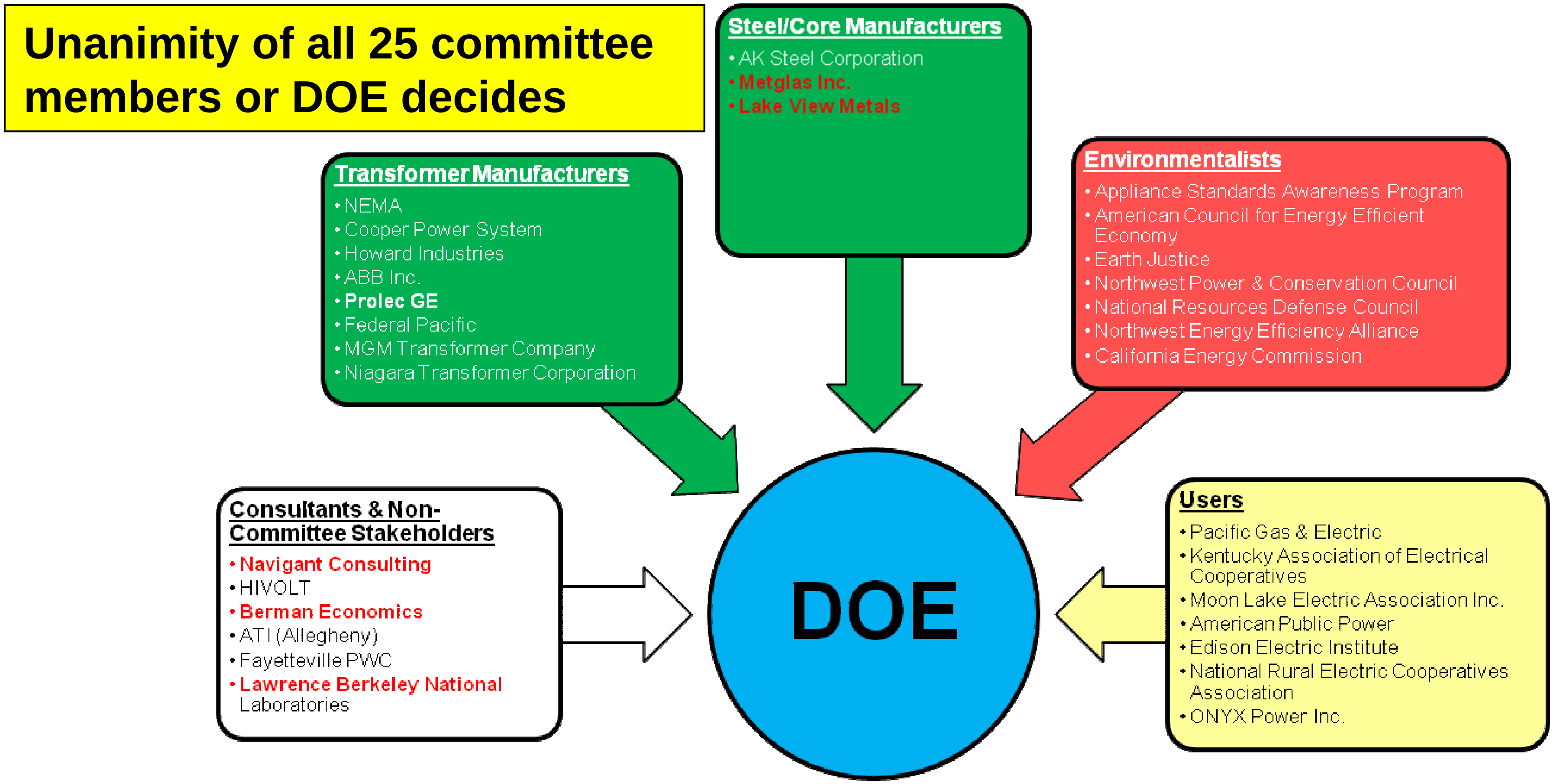
2010 Efficiency Standard Status

- Environmental interest groups filed a lawsuit against the DOE in an effort to require higher minimum efficiency levels.
- As part of the settlement, the DOE agreed to re-evaluate the current efficiency levels by October 1, 2011 and if necessary, issue a final rule by October 1, 2012 with an effective date of January 1, 2016.
- DOE created a subcommittee of stakeholders to explore higher efficiency levels in a negotiated format. First meeting held September 2011.
- Three meetings held thus far, driving toward final resolution by February 1, 2012.
- DOE evaluating approximately 7 levels of increased efficiency.

2016 Efficiency Levels Being Considered

Design Line	2010 DOE Efficiency	EL1	EL2	EL3	EL4	EL5	EL6	EL7
DL1 50kVA 1Ph Pad	99.08	99.16	99.22	99.25	99.31	99.42	99.50	-
DL2 25kVA 1Ph Pole	98.91	99.00	99.07	99.11	99.18	99.31	99.41	99.46
DL4 150kVA 3Ph Pad	99.08	99.16	99.22	99.25	99.31	99.42	99.50	99.60
DL5 1500kVA 3Ph Pad	99.42	99.48	99.51	99.54	99.57	99.61	99.69	-

Negotiated Rule Making Subcommittee



- **Transformer & conventional steel manufacturers lobbying for a standard that allows M3 to compete w/ amorphous on price/performance.**
- **Metglas, Lakeview Metals, Berman Economics lobbying for 100% amorphous .**
- **Users split, some don't buy into the economic analysis, some want higher efficiencies.**
- **Navigant & LBNL somewhat defensive regarding their analysis.**

2016 Efficiency Standard

- Financial justification of higher efficiency levels very questionable (see appendix).
- If DOE moves to any of the higher levels under consideration than EL1, there will likely be loss of transformer manufacturers and also jobs in transformer industry.
  - Capital investment of many millions per manufacturing plant will be required to maintain current business levels, customers and jobs, preventing other business investments/expansion.
  - Exotic (amorphous) core materials required – only foreign companies making these materials (one foreign-owned plant in Conway, SC).
  - Conventional US core steel suppliers may be driven out of business.
  - Refurbished transformers, which do not need to meet the higher efficiency levels, may be more attractive to end users, preventing new transformers from being built in WI.

Appendix

Potential Shortcomings of DOE's Analysis

- Analysis assumes conservative cost of money (3%) over 30 year period.
- Does not acknowledge that higher transformer costs will ultimately be passed on to electric consumers.
- Does not consider the cost of capital equipment required to convert from manufacturing nearly 100% conventional core steel to 100% amorphous core transformers.
- Does not appropriately consider the costs associated with poles that will need to be replaced in order to support larger/heavier units.
- Amorphous core transformers are able to save small amounts of energy during periods of low loading, but during peak loading, transformers constructed from conventional core steel are much more efficient, coinciding with when the cost of energy is highest. DOE analysis does not segregate the two.
- No alternative to amorphous at higher efficiency levels, lending amorphous suppliers tremendous pricing power.
- One primary (foreign) supplier for amorphous worldwide, with manufacturing plants in Japan and South Carolina. One new (Chinese) market entrant.
- Does not consider how many transformers will be rebuilt and thus do not need to comply with the efficiency standard, as opposed to new purchases. Could significantly alter assumed payback periods.
- Considers average transformer life to be 30 years, extending out to 60 years, rather than the 20.6-year life that IEEE standards require designs to meet.

Potential Shortcomings of DOE's Analysis

- Does not consider increased loading over 30-60 year timeframe (assumes 30 or 35% loading over 60 years). Electric vehicles could substantially increase loading.
- Negotiated rulemaking subcommittee a bit of a sham in that it requires unanimity in order to adopt anything, or else the DOE does whatever it wants to do. This gives the appearance of wide industry support for what may wind up being a DOE-only decision. Also very little time to reach agreement – DOE just looking for approval, rather than new testimony.
- DOE has not confirmed the resulting prices of the designs they are basing their conclusions upon by requesting quotations from actual transformer manufacturers.
- Cost of quality for amorphous core transformers is not considered, even if only 1% higher.
- Does not consider the impact of removing network and vault-type transformers from the standard if omitted.
- Starts with 2010 efficiency standards as the baseline for payback analysis. The previous standard showed payback periods from 7.4 to 15.6 years. New payback periods will add to that and may exceed the average life expectancy of a transformer.

Summary

- The DOE appears to want a rubber stamp on the efficiency levels they have selected rather than any engineering input on what is best for the country. When we build a new transformer design which affects many units, if we don’t have experience, we would create a prototype to determine precisely the end result.
- The DOE has created mountains for paper designs using a program they purchased that has errors according to knowledgeable engineers. The DOE is basing the targeted efficiency levels on the paper designs without building even one transformer. In the Sept. meetings we requested that the DOE obtain at least quotes for manufacturers to validate the designs that their programs selected. No requests for quotes were issued.