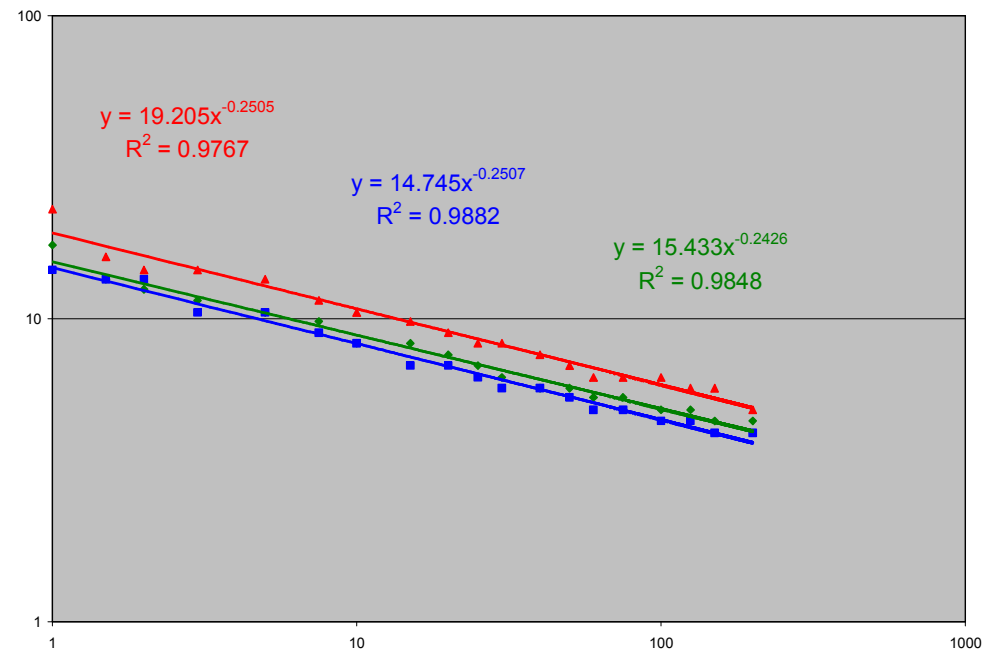




Modeling Motor Losses

- DOE developed a model describing a motor's losses as a function of its rated horsepower.
- DOE plotted the standards adopted by the Energy Independence and Securities Act of 2007 (EISA):
 - Delta (100-efficiency level) vs. horsepower
 - Plotted on a logarithmic scale, delta decreased with according to a power law (-.25 exponent)



$$\text{Efficiency}(hp') = 100\% - K * (100\% - \text{Efficiency}(1)) * (hp')^{-0.25}$$



Scaling from Equipment Classes Analyzed

- **Assumptions:**
 - Efficiency can be defined as a function of horsepower.
 - DOE used the EISA standard for 1 hp, 4-pole, open constructed motor as a reference point for the equivalent small electric motor.
 - A similar efficiency level (e.g. NEMA Premium level) for different equipment classes can be described by some constant K.

Matrix of K Values used for Scaling CSLs

	Polyphase	CSIR	CSCR
2 Poles	1.37	2.10	1.58
4 Poles	1.00	1.53	1.15
6 Poles	1.06	1.62	1.21



Preliminary Candidate Standard Levels

Candidate Standard Level	Polyphase, 56 Frame 4-pole, 1 hp	CSIR, 48 Frame, 4-pole, 0.5 hp	CSCR, 56 Frame, 4-pole, 0.75 hp
CSL 1	84.0%	70.8%	80.2%
CSL 2	85.5%	73.6%	82.0%
CSL 3	86.5%	75.4%	83.3%
CSL 4	88.0%	78.1%	85.1%
CSL 5	90.0%	81.8%	87.6%



Other Issues

DOE invites comments and recommendations from stakeholders on any other aspects related to the engineering analysis.