FirstEnergy Energy Efficient New Homes Program
Lights & Appliances: How To Benefit from the Low-Hanging Fruit

FirstEnergy
Ohio Edison • The Illuminating Company • Toledo Edison

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PERFORMANCE SYSTEMS DEVELOPMENT

Optimizing Savings

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Performance Systems Development

July 10, 2012

- ▶ Lighting & Appliance Choices
- ▶ Attention to Detail
- ▶ Modeling Accuracy
- ▶ Quality Assurance

Presentation Goals

➤ Installation of ENERGY STAR Appliances and Efficient Lighting.

➤ Accurate modeling considerations.

➤ Ways to maximize savings and increase builder incentives.

ENERGY STAR New Homes Version 3 Implementation Schedule

Permit Date [2]	Date of Final Inspection [1]		
	4/1/2011	1/1/2012	7/1/2012
Before 4/1/2011 [3,4]	v2	v2.5	v3 →
Between 4/1/2011 and 12/31/2011 [4]		v2.5	v3 →
On or after 1/1/2012 [5]			v3 →

Version 2	Version 2: 2006 Guidelines
Version 2.5	Version 2.5: Core Version 3 energy efficiency measures with Air Barriers and Air Sealing sections of Thermal Enclosure System Rater Checklist; Other checklists completed but not enforced
Version 3	Version 3: Core Version 3 energy efficiency measures with all checklists completed and enforced

ENERGY STAR V 3.0 Says.....

Under the Prescriptive Path only:

▶ **Lighting & Appliances**

- *Where refrigerators, dishwashers, ceiling fans, or exhaust fans are installed, products shall be ENERGY STAR qualified.*

- *ENERGY STAR qualified CFLs, LEDs, or pin-based lighting in 80% of fixtures in RESNET-defined Qualifying Light Fixture Locations, shall be installed.*

L&A Packages

Benefits of Energy Efficient Lighting & Appliance Packages:

▶ ENERGY STAR brand is recognized by homebuyers.

▶ "New and Improved" CFL products.

- *Dimmable Bulbs*
- *3 Way Bulbs*
- *Fancy Fixtures*
- *CFLs disguised as incandescent – aesthetically pleasing*

ENERGY STAR Appliances

The Home Should be Getting Credit For…

▶ Refrigerators (kWh/yr)
▶ Dishwashers (Energy Factor or EF)
▶ Ceiling Fan (CFM/Watt)
▶ Exhaust / Ventilation Fans (Watts)

CFL and FL Lighting

The Home Should be Getting Credit For…

➢ Interior Fixtures

- *CFL (%)*
- *Pin-Based FL (%)*

➢ Exterior Fixtures (%)

➢ Garage Fixtures (%)

Much Maligned CFLs

Common complaints: "CFLs…"

- ….are "ugly".
- …bad light color.
- …are slow to start.
- …don't last as long as claimed.
- …contain Mercury.

For more information on all sources of mercury, visit http://www.epa.gov/mercury
For more information about compact fluorescent bulbs, visit http://www.energystar.gov/cfls

You've Come A Long Way, Baby

LIGHT OUTPUT EQUIVALENCY

To determine which ENERGY STAR qualified light bulbs will provide the same amount of light as your current incandescent light bulbs, consult the following chart:

INCANDESCENT LIGHT BULBS	MINIMUM LIGHT OUTPUT	COMMON ENERGY STAR QUALIFIED LIGHT BULBS
WATTS	LUMENS	WATTS
40	450	9-13
60	800	13-15
75	1,100	18-25
100	1,600	23-30
150	2,600	30-52

LEARN MORE AT energystar.gov

What About Mercury?

Yes, CFLs contain Mercury…but

▶ CFLs contain an average of 4 mg. Old Mercury thermometers contained 500 mg!

▶ Using a CFL reduces the amount of mercury in the environment by reducing mercury emissions from power plants.

For more information on all sources of mercury, visit http://www.epa.gov/mercury
For more information about compact fluorescent bulbs, visit http://www.energystar.gov/cfls

QA: On-Site Inspection Stage

New Homes Onsite inspection Process

1. Exterior
   - Orientation
   - Elevations
   - Measure footprint
   - Outdoor temperature
2. Interior
   - Attic insulation
   - Wall insulation
   - **Room by Room lighting count**
   - **Appliances**
   - Document Htg/Clg/DWH
   - Infiltration
   - Duct testing
3. Re-enable appliances
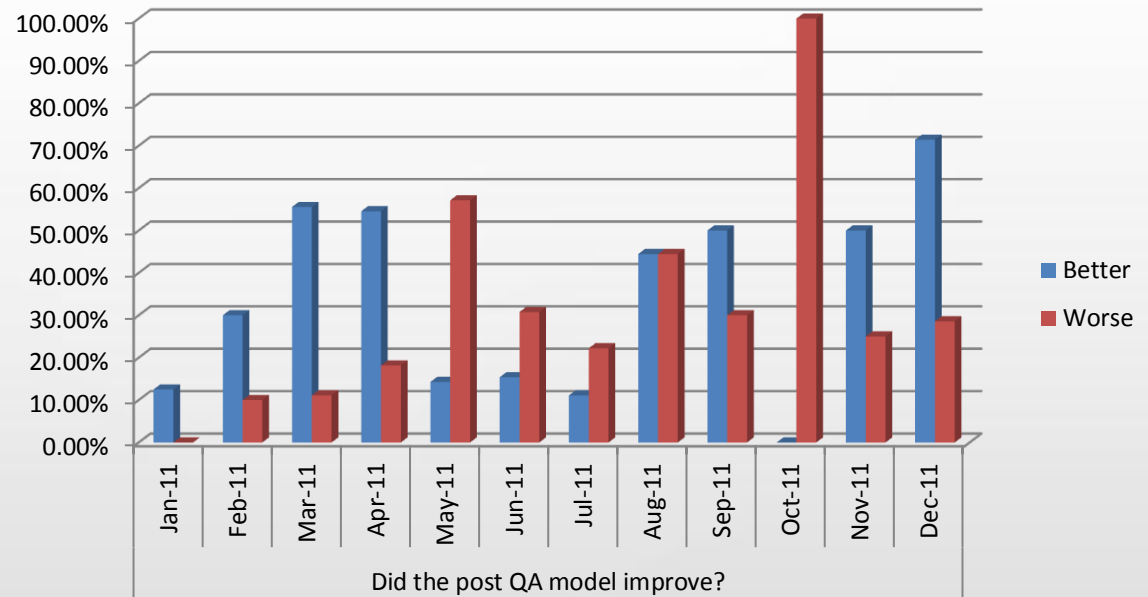4. Double check all items on the inspection checklist

On-Site QA Observations
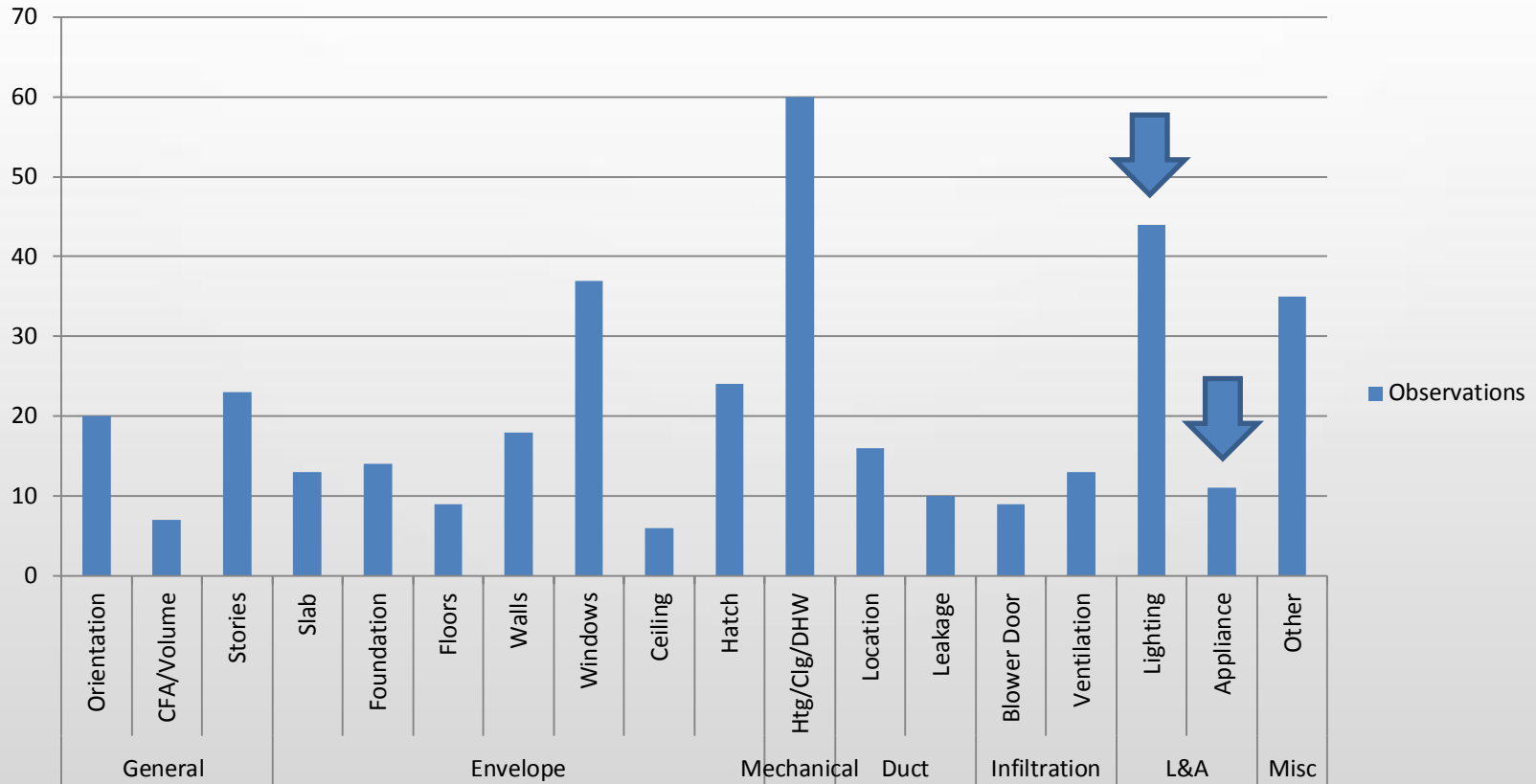
7 of 12 month resulted in post QA models generated more savings

Did the post QA model improve?

Legend: Better (blue), Worse (red)

Accurate modeling = Increased savings predictions
Accurate modeling = increased builder incentives

Modeling Considerations

Modeling considerations that increase builder incentives

➢ ***Lighting***

➢ ***Appliances***

➢ *Mechanical Equipment*
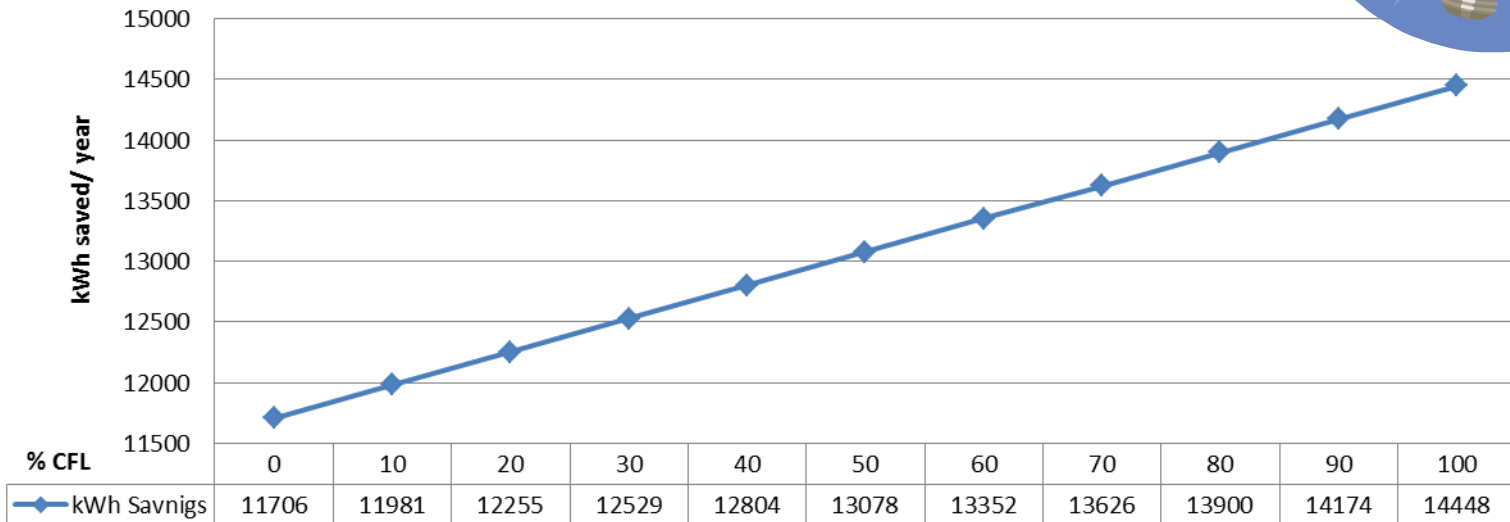
➢ *Mechanical Ventilation*

➢ *Stories Above Grade*

➢ *Windows*

An Accurate Lighting Count Counts!!

- 5093 sf house, 44,027 cu ft volume.
- 0% CFL=11,706 kWh=$1570.60 in incentives, $3134 AEC.
- 100% CFL=14,448 kWh=$1844.80 in incentives, $2844 AEC.
- Additional $274.20 in incentives, $290 AEC Savings.

kWh Savings

% CFL	0	10	20	30	40	50	60	70	80	90	100
kWh Savnigs	11706	11981	12255	12529	12804	13078	13352	13626	13900	14174	14448

(y-axis: kWh saved/ year, range 11500 to 15000)
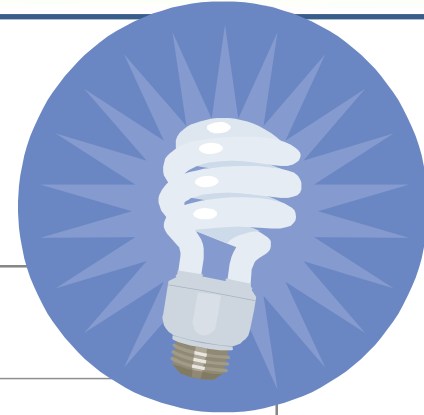
Lighting

➢ Often CFL % findings onsite are higher than modeled

  ➢ *Account for all efficient lighting to maximize kWh savings*

  ➢ *Model LEDs as CFL lighting*

Modeling Lighting Accurately

Real Program Submittal:

- Rater defined 60% pin-based CFL

- Interior fixtures:
  - *CFL (%) 0.0*
  - *Pin-Based FL (%) 60.0*

- Exterior Fixtures (%) 0.0

- Garage Fixtures (%) 0.0

Modeling Lighting Accurately

Actual QA Findings:

- 137 Photos Taken
  - *67 Interior fixtures:*
    - 21 CFL (31%)
    - 41 pin-based (61%)
  - *19 Ext. lights (100%)*
  - *7 Garage lights (100%)*
- 93 total lights
  - *Only 5 incandescent (7% of Int. Lighting)*

▶ **Interior Fixtures CFL (%)**

- The ratio, expressed as a percentage, of (compact fluorescent lights in *Qualifying* **Interior** *Light Fixtures)* to (all light fixtures in *Qualifying* **Interior** *Light Fixture Locations)*.

- This is really focused on any Edison-base (screw-in) lamps, whether LED or Fluorescent.

▶ **Pin-Based FL (%)**

- The ratio, expressed as a percentage, of (pin-based fluorescent lights in *Qualifying* **Interior** *Light Fixtures)* to (all light fixtures in *Qualifying* **Interior** *Light Fixture Locations)*.

▶ **Exterior Fixtures (%)**

- The ratio, expressed as a percentage, of (lights in *Qualifying* **Exterior** *Light Fixtures)* to (all light fixtures in *Qualifying* **Exterior** *Light Fixture Locations)*.

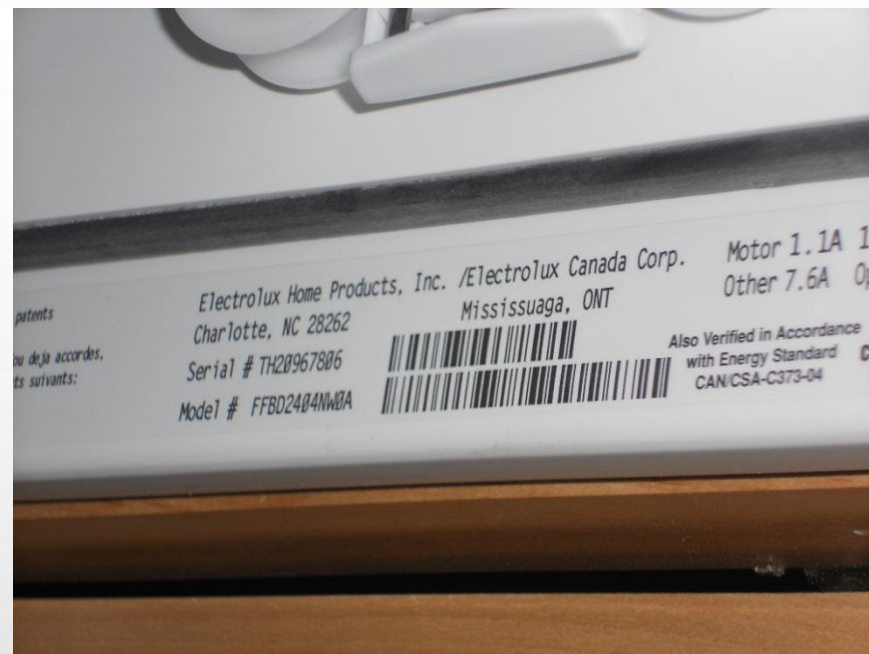- In other words, this value could be as high as 100%.

▶ **Garage Fixtures (%)**

- The ratio, expressed as a percentage, of (lights in *Qualifying* **Exterior** *Light Fixtures)* to (all light fixtures in *Qualifying* **Exterior** *Light Fixture Locations)*.

- In other words, this value could be as high as 100%

RESNET Standard trumps REM/Rate Help

Modeling Appliances

Take Pictures

- *Eliminates model number errors*
- *Easy to save and file - Convenience*

QA Review: Appliances

Model using REM defaults Appliances

Refrigerator – 691 kWh

Dishwasher – 0.46 Ef

This home is predicted to save 1509 kWh over a standard new home.

Annual End-Use Consumption	Reference	As Designed	Diff
Heating (CCF)	786	368	419
Heating (kWh)	823	292	531
Cooling (kWh)	1698	803	894
Water Heating (CCF)	241	227	14
Lights & Appliances (CCF)	71	71	
Lights & Appliances (kWh)	7032	6948	84

Model using ES Appliances

Refrigerator – 425 kWh

Dishwasher – 0.70 Ef

This home is predicted to save 1834 kWh over a standard new home.

Annual End-Use Consumption	Reference	As Designed	Diff
Heating (CCF)	786	372	414
Heating (kWh)	823	292	531
Cooling (kWh)	1698	782	915
Water Heating (CCF)	241	221	20
Lights & Appliances (CCF)	71	71	
Lights & Appliances (kWh)	7032	6644	388

325 **increase** in kWh savings. Savings are not just in Lights & Appliances!

Energy Factor & kWh/yr

EF -- This is the standard method of evaluating dishwashers; it combines the electrical energy and the water heating energy. Units are cycles/kWh.

kWh/yr -- On modern EnergyGuide labels, this combines the electrical and water heating energy, and is the new measure of dishwasher energy consumption

Appliance Websites

- *http://www.energystar.gov/*

- *http://www.aham.org/*
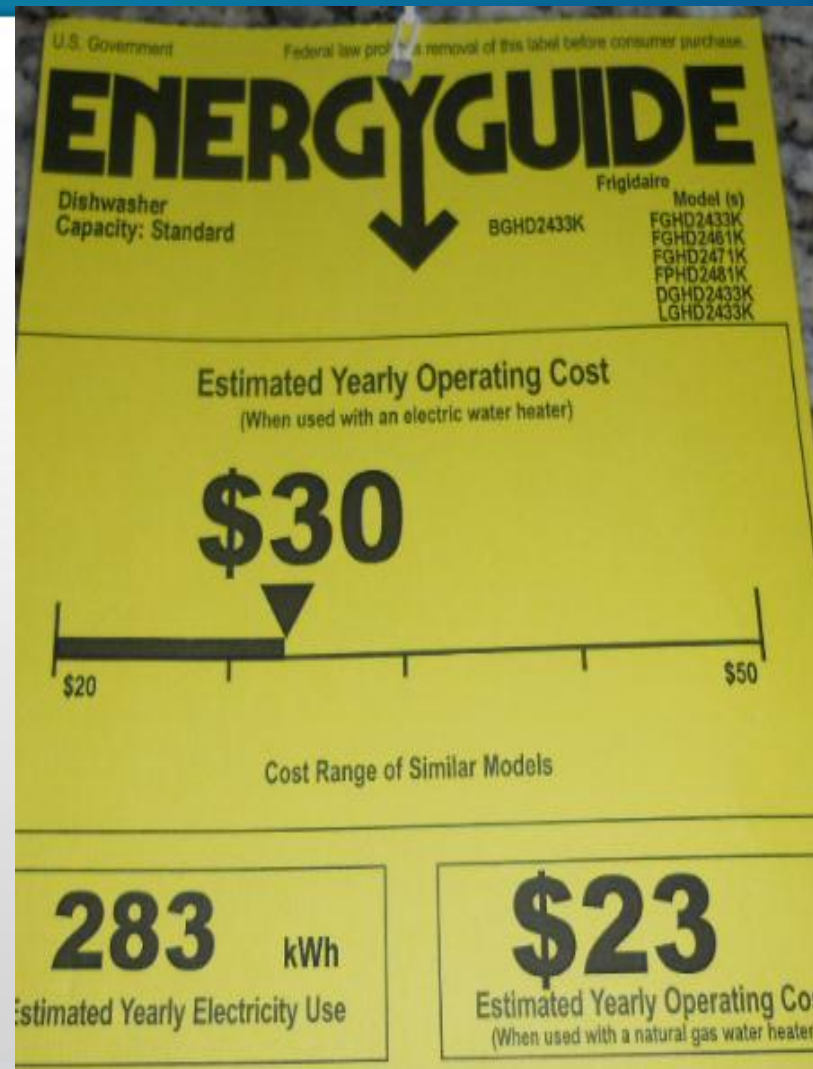
- *Search Engines*

Dishwashers Qualified Product List

List Posted on April 04, 2012

Below are currently qualified ENERGY STAR models available for sale in the U.S.

Product Brand Name	Product Model Number	Size	Annual Energy Use (kWh/year)	Federal Standard (kWh/year)	% Better than Federal Standard (kWh/year)	Water Use (Gallons/Cycle)	Energy Factor (EF)	Date Qualified
Amana	ADB1400PY**	Standard	288	355	19%	3.41	0.76	9/30/2011
Asko	D5424	Standard	276	355	22%	3.87	0.78	1/27/2012
Asko	D5434	Standard	231	355	35%	3.87	0.93	1/27/2012
Asko	D5524	Standard	276	355	22%	3.87	0.78	1/27/2012
Asko	D5534	Standard	231	355	35%	3.87	0.93	1/27/2012
Asko	D5554	Standard	206	355	42%	4.12	1.05	1/27/2012
Asko	D5624	Standard	276	355	22%	3.87	0.78	1/27/2012
Asko	D5634	Standard	231	355	35%	3.87	0.93	1/27/2012
Asko	D5654	Standard	206	355	42%	4.12	1.05	1/27/2012
Asko	D5894A	Standard	171	355	52%	4.10	1.26	12/12/2011
Asko	D5954	Standard	276	355	22%	3.87	0.78	1/27/2012

PA & OH Program Reminder

New Builder Signage!

Download and Print!

➢ Builder Signage is Available!

➢ Post in your model and spec homes!

➢ Versions available for PA and OH Utilities.

Need More Information?

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PERFORMANCE SYSTEMS
D E V E L O P M E N T

Thank You for your participation in our program!