

Regression Test Validation of Autodesk Green Building Studio

Regression Test Validation Results: Build Version 2014.2.29.6004, Release Date May 15, 2013

Green Building Studio (GBS) Build 2014.2.29.6004, released May 15, 2013 passed the regression testing. The new release has differing, but expected energy usage results compared to the previous release dated 2/22/2013. All previous successfully simulated files are successfully simulated. All intentionally blocked files from previous release blocked. The number of surfaces and area of surfaces; the number of openings and area of openings remain unchanged for all runs.

Summary of Test Cases

The current iteration runs 464 energy analysis simulations, using 464 different GBS projects and 4 different conceptual models. The main purposes of the regression testing are:

1. Exercise different model configurations and building types in 16 ASHRAE climate zones for pass/fail
2. Compare energy usage results between previous release and current release candidate.

	Weather data source	Number of Building Types	Number of locations	Number of models	number of test cases
Test Suite A	Autodesk Climate Server	29	16 U.S.	4	464
Test Suite B	TMY2	1	1 U.S.	201	201

Table 1. Test Cases

Regression Test Cases

Test Suite A

The current iteration runs 464 energy analysis simulations, using 464 different projects & 4 different xml files.

Main purposes

1. Exercise building types in 16 ASHRAE climate zones for pass/fail
2. Tracks Energy results

Test Suite B

Currently runs 201 xml files under one GBS project

These are old models (~4 years. Some run, some are intentionally blocked, and some intentionally crash/fail)

Main purposes:

1. Automotive Facility	10. Gymnasium	19. Performing Arts Theater	28. Transportation
2. Convention Center	11. Health Care Clinic	20. Police Station	29. Warehouse
3. Courthouse	12. Hospital	21. Post Office	
4. Dining: Bar Lounge/Leisure	13. Hotel	22. Religious Building	
5. Dining: Cafeteria/ Fast Food	14. Library	23. Retail	
6. Dining: Family	15. Motel	24. School/University	
7. Dormitory	16. Motion Picture Theatre	25. Single Family	
8. Exercise Center	17. Office	30. Sports Arena	
9. Fire Station	18. Penitentiary	31. Town Hall	

Models

Models used for the energy simulations include: 4 simplified schematic models to fully exercise all GBS energy setting defaults and 201 previously failed models and intentionally blocked models (obtained with users' permission). GBS automatically applies intelligent energy setting defaults to models where the parameters necessary for energy analysis have not been specified. These default values vary by building type, building size, and location. The GBS WikiHelp topic, [Green Building Studio Building Assumptions and Details](#), provides more information on these defaults.

Regression Test Criteria

Regression test criteria determine whether or not energy usage results of the new release are within an acceptable tolerance range with the results of the previous release. Tests are passed where differences are expected due to bug fixes and improvements.

Results Detail:

The following differences are all due to a bug fix and an improvement. The bug fix addressed the method used for floor and ceiling area calculations used for for generating the DOE-2 .inp file for simulation. The improvement revised the assignment of schedules for infiltration rates.

- Domestic Hot Water process flow
- Outside ventilation flow rates
- Plug loads
- Lighting loads
- Occupancy density
- Loads due to Infiltration

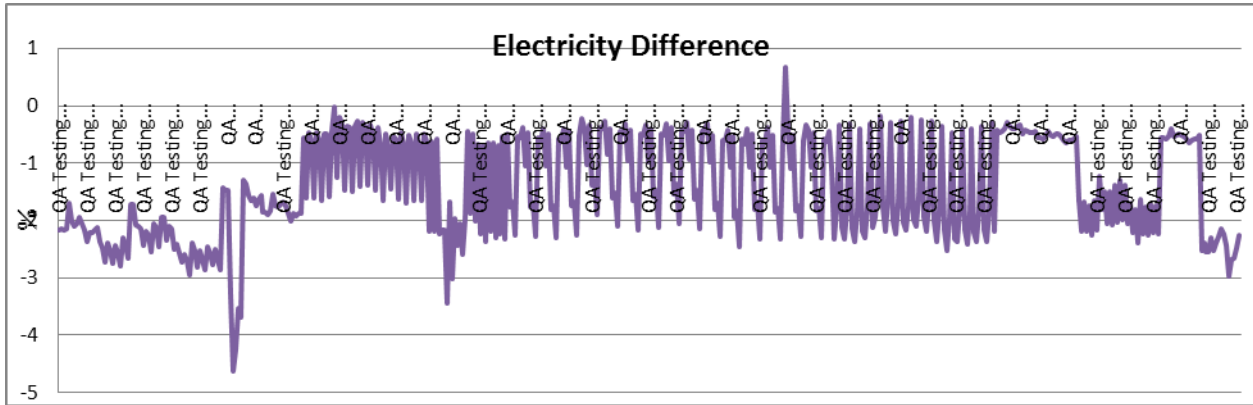
Cases where the DOE-2 daylighting keyword is not written to the DOE-2 file is acceptable for this release, as it has no impact on energy results. Currently daylighting energy savings are calculated using the California Energy Commission method of applying an adjustment to the lighting power density, rather than simulating the daylighting in DOE-2.

Electricity usage decreased for all runs except one. The average decrease is -1.44%, maximum decrease is -4.619%, one run increased by 0.66%.

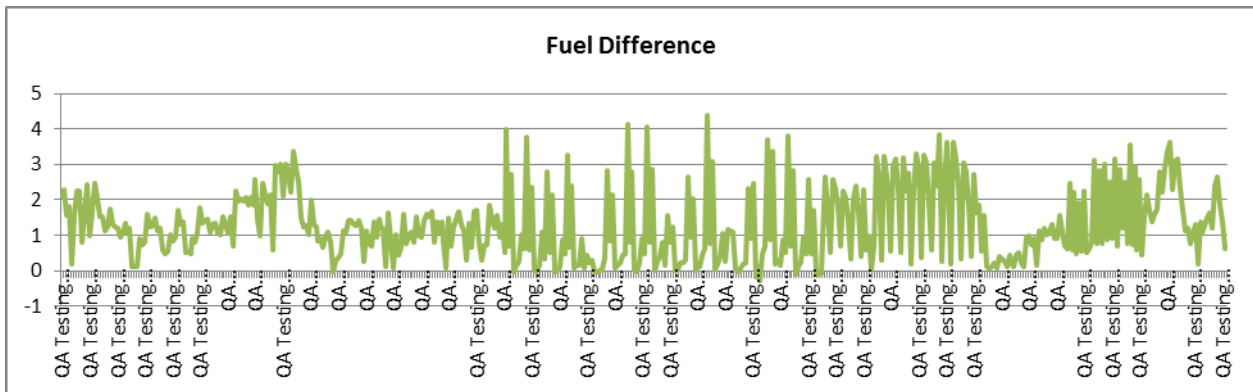
Fuel usage increased for most runs. Average increase is 1.29%, maximum increase is 4.398%

Detailed results

- Electricity usage change:



- Fuel usage change



- The following images show the differences between DOE-2 files

- Infiltration schedule

```

583 $ Infiltration -
584 "ds-241-FanINF" = DAY-SCHEDULE
585 TYPE = FRACTION
586 HOURS = (1, 24)
587 VALUES = ( 1,
588             1,
589             1,
590             1,
591             1,
592             1,
593             1,
594             0.25,
595             0.25,
596             0.25,
597             0.25,
598             0.25,
599             0.25,
600             0.25,
601             0.25,
602             0.25,
603             0.25,
604             0.25,
605             0.25,
606             0.25,
607             0.25,
608             0.25,
609             1,
610             1 )
611 ..
    
```

```

583 $ Infiltration -
584 "ds-241-FanINF" = DAY-SCHEDULE
585 TYPE = FRACTION
586 HOURS = (1, 24)
587 VALUES = ( 1,
588             1,
589             1,
590             1,
591             1,
592             1,
593             1,
594             0,
595             0,
596             0,
597             0,
598             0,
599             0,
600             0,
601             0,
602             0,
603             0,
604             0,
605             0,
606             0,
607             0,
608             0,
609             1,
610             1 )
611 ..
    
```

- Lighting power density and daylighting

6817				6817			
6818	VOLUME	=	23944.0	6818	VOLUME	=	23944.0
6819	LTG-SPEC-METHOD	=	POWER-DEFINITION	6819	LTG-SPEC-METHOD	=	POWER-DEFINITION
6820	LIGHTING-W/AREA	=	(1.199)	6820	LIGHTING-W/AREA	=	(1.24)
6821	EQUIPMENT-W/AREA	=	(1.2196)	6821	EQUIPMENT-W/AREA	=	(1.2196)
6822	NUMBER-OF-PEOPLE	=	25.5	6822	NUMBER-OF-PEOPLE	=	25.5
6823	PEOPLE-HG-SENS	=	250.0	6823	PEOPLE-HG-SENS	=	250.0
6824	PEOPLE-HG-LAT	=	200.0	6824	PEOPLE-HG-LAT	=	200.0
6825	AZIMUTH	=	0.0	6825	AZIMUTH	=	0.0
6826	X	=	0.0	6826	X	=	0.0
6827	Y	=	0.0	6827	Y	=	0.0
6828	Z	=	0.0	6828	Z	=	0.0
6829				6829			
6830	SHAPE	=	POLYGON	6830	SHAPE	=	POLYGON
6831				6831			
6832	POLYGON="sp-7-SpaceGEOM"			6832	POLYGON="sp-7-SpaceGEOM"		
6833				6833			
6834	C-SUB-AREA	=	2660.444	6834	C-SUB-AREA	=	2660.444
6835	C-OCC-TYPE	=	10	6835	C-OCC-TYPE	=	10
6836				6836			
6837				6837			
6838	ZONE-TYPE	=	CONDITIONED	6838	ZONE-TYPE	=	CONDITIONED
6839	LIGHTING-SCHEDULE	=	"LightSched-35"	6839	LIGHTING-SCHEDULE	=	"LightSched-35"
6840	PEOPLE-SCHEDULE	=	"peopleSched-34"	6840	PEOPLE-SCHEDULE	=	"peopleSched-34"
6841	DAYLIGHTING = NO						
6842				6842			
6843	MIN-POWER-FRAC	=	0.300000	6843	MIN-POWER-FRAC	=	0.300000
6844	MIN-LIGHT-FRAC	=	0.100000	6844	MIN-LIGHT-FRAC	=	0.100000
6845	LIGHT-SET-POINT1	=	30.000000	6845	LIGHT-SET-POINT1	=	30.000000
6846	ZONE-FRACTION1	=	0.295000	6846	ZONE-FRACTION1	=	0.295000
6847	LIGHT-REF-POINT1	=	(48.24852700,	6847	LIGHT-REF-POINT1	=	(48.24852700,
6848				6848			50.07490000,
6849				6849			9.50000000)
6850				6850			
6851	LIGHT-SET-POINT2	=	30.000000	6851	LIGHT-SET-POINT2	=	30.000000
6852	ZONE-FRACTION2	=	0.095000	6852	ZONE-FRACTION2	=	0.095000
6853	LIGHT-REF-POINT2	=	(2.71705400,	6853	LIGHT-REF-POINT2	=	(2.71705400,
6854				6854			51.29447900,
6855				6855			9.50000000)
6856				6856			

- Lighting and equipment power density, and number of people

4041				4041			
4042	VOLUME	=	963181.998	4042	VOLUME	=	963181.998
4043	LTG-SPEC-METHOD	=	POWER-DEFINITION	4043	LTG-SPEC-METHOD	=	POWER-DEFINITION
4044	LIGHTING-W/AREA	=	(1.6)	4044	LIGHTING-W/AREA	=	(1.604)
4045	EQUIPMENT-W/AREA	=	(0.5412)	4045	EQUIPMENT-W/AREA	=	(0.5414)
4046	NUMBER-OF-PEOPLE	=	7042.1	4046	NUMBER-OF-PEOPLE	=	7044.2
4047	PEOPLE-HG-SENS	=	250.0	4047	PEOPLE-HG-SENS	=	250.0
4048	PEOPLE-HG-LAT	=	200.0	4048	PEOPLE-HG-LAT	=	200.0
4049	AZIMUTH	=	0.0	4049	AZIMUTH	=	0.0
4050	X	=	0.0	4050	X	=	0.0
4051	Y	=	0.0	4051	Y	=	0.0
4052	Z	=	0.0	4052	Z	=	0.0

Comparison all of the surface counts and areas, and the opening counts and areas between pre- and post-processed gbXML files with zero percent change between the current and the previous release.

