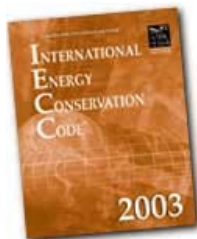


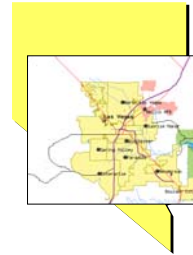
MICROPAS7 and the 2003 IECC for Southern Nevada

MICROPAS



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July 14, 2005



MICROPAS

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Ken Nittler, PE



- Owner of Enercomp and Micropas Author
- 25 year experience with building energy codes
- 10 year participant at MEC/IECC code hearings
- Member, RESNET software approval task group
- Licensed mechanical engineer
- Consultant to state agencies on energy codes
- Member ASHRAE, NFRC, CABEC
- Expert on Fenestration energy performance
- Leader of hundreds of Micropas seminars

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Key Topics

- Concept Behind Micropas
 - Proven and Robust
- 2003 IECC Implementation
 - Meets or exceeds Southern Nevada Amendments, IECC Chapter 4 requirements
- Third Party Approval
 - Base program approved by rigorous California Energy Commission process
 - Will submit for RESNET approval

Micropas History

- Approved under software approval rules administered by the California Energy Commission (CEC) since 1983
- Leading software used by production builders
- Used on more than a Million of California Homes for Energy Code Compliance
- Concept behind IECC Chapter 4 identical to California's Title-24

Compliance Process

- Step 1 - User enters building description for the proposed home
- Step 2 - User runs proposed home. Micropas automatically generates and runs the standard home in accordance with IECC requirements
- Step 4 - User varies energy features until building complies
- Step 5 - Compliance reports are printed and submitted
- Step 6 - Plan check process reviews reports for consistency with plans and specifications

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Proposed vs. Standard

- Proposed design with desired features
- Standard design has same gross areas as proposed with exactly the prescriptive features found in Chapters 4 & 5 and Table 502.2



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Compliance Margin

MICROPAS7 v7.00 File-MP7BASE Wth-NVLASVEG Program-MAIN

MICROPAS RUN SUMMARY

Energy Use (kBtu/sf-yr)	Standard Design	Proposed Design	Compliance Margin	Sizing (Btu/hr)
Space Heating....	9.60	10.73	-1.13	33,049
Space Cooling....	43.49	32.50	10.99	29,540
Water Heating....	17.03	14.48	2.55	n/a
Total	70.12	57.71	12.41	n/a

*** Building complies with Computer Performance ***
** IECC_2003 Source Energy Rules with 2238 HDD *

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Source not Site



- Important amendment to 402.3.3
- Site energy inappropriate for cooling climate
- $1 \text{ kWh} = 3 * 3.413 \text{ kBtu}$
- As a practical matter, this places a heavier emphasis on cooling where it belongs in Las Vegas area

Source vs. Site Energy

Energy Use (kBtu/sf-yr)	Standard Design	Proposed Design	Compliance Margin	Sizing (Btu/hr)
Space Heating...	9.60	10.73	-1.13	33,049
Space Cooling...	43.49	32.50	10.99	29,540
Water Heating...	17.03	14.48	2.55	n/a
Total	70.12	57.71	12.41	n/a

*** Building complies with Computer Performance ***
 *** IECC_2009 Source Energy rules with 2238 HOB ***

Energy Use (kBtu/sf-yr)	Standard Design	Proposed Design	Compliance Margin	Sizing (Btu/hr)
Space Heating...	9.35	10.45	-1.10	33,049
Space Cooling...	14.50	10.83	3.67	29,540
Water Heating...	17.03	14.48	2.55	n/a
Total	40.88	35.76	5.12	n/a

*** Building complies with Computer Performance ***
 *** IECC_2009 Site Energy rules with 2238 HOB ***

Compliance Reports

- See separate handout
- Software reports every input that user controls that affects compliance on the report
- Report is called the “Certificate of Compliance” or CF-1R for short

IECC Version Development

- 1st - Follow Southern Nevada Amendments
 - Source energy and multiple orientation
- 2nd - Follow IECC Chapter 4
 - Some details in Chapter 5 and Appendix
 - Improved models on duct and air leakage
- 3rd - Follow California Title 24 rules where IECC silent
 - Robust, tested, complete, independent

Improved Models on Features that can be Tested

- Duct leakage (Section 402.2.3.8) and Air leakage (Section 402.2.3.9)
- Program follows California Rules which are far more current, complete, consistent and accurate
- Allows both standard and proposed runs to be modeled using same calculation and assumptions

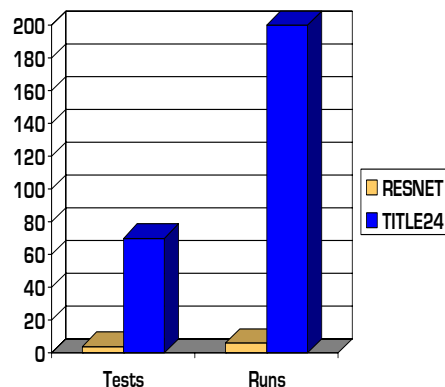


Third Party Approval

- Base program approved by California Energy Commission for use with Title-24 building energy code
- Passes Tier One HERS BESTEST, the baseline for RESNET approval.
- Will submit for approval under new RESNET rules although rules really directed towards mortgage issues not building codes

Software Approval Comparison

- IECC Chapter 4
 - 4 pages
 - no software tests
- RESNET
 - 4 software tests
 - 6 actual runs
- Title-24
 - 70 software tests
 - hundreds of actual runs



Advantages of Micropas Background

- Years of development under rational public process
- Consistent plan checker friendly compliance reports
- Game playing with software rules and assumptions already eliminated over the years of revisions under building standards environment

Sample Home

- 2689ft² Two Story Slab on Grade
- 16.5% glass area



Single Orientation

MICROPAS7 v7.00 File-LV1 wth-NVLASVEG Program-MAIN

MICROPAS RUN SUMMARY

Energy Use (kBtu/sf-yr)	Standard Design	Proposed Design	Compliance Margin	Sizing (Btu/hr)
Space Heating....	13.22	12.32	0.90	47,665
Space Cooling....	44.86	40.06	4.80	48,714
Water Heating....	9.99	9.45	0.54	n/a
Total	68.07	61.83	6.24	n/a

*** Building complies with Computer Performance ***
 *** IECC_2009 Source Energy rules with 2218 HDD ***

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Multiple Orientation

MICROPAS7 v7.00 File-LV2 wth-NVLASVEG Program-MAIN

MICROPAS CARDINAL RUN SUMMARY

Energy Use (kBtu/sf-yr)	Standard Design	Proposed Design	Compliance Margin	Heating (Btu/hr)	Cooling (Btu/hr)
North.....	68.07	60.78	7.29	47,665	47,840
East.....	68.07	61.83	6.24	47,665	48,714
South.....	68.07	60.59	7.48	47,665	47,183
West.....	68.07	62.07	6.00	47,665	49,806

*** Building complies with Computer Performance ***
 *** IECC_2009 Source Energy rules with 2218 HDD ***

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Above Code Programs N-HERS Version

- Special version; clearly marked printouts
- Allows use of additional HERS verified features
 - TXV
 - EER
 - Insulation Quality
 - Airflow
 - Air Conditioner Size
 - Buried ducts
- Includes revised printouts with % above code and HERS score



Getting to Dollars



- To convert from source energy into therms:
 - Source energy * floor area / 100.0 = # of therms
 - # of therms * dollars/therm = dollars
- To convert from source energy into kWh:
 - Source energy * floor area / (3 * 3.413) = # of kWh
 - # of kWh * dollars/kWh = dollars

Conclusion

- Micropas is proven energy code compliance software
- 2003 IECC Implementation meets or exceeds Southern Nevada Amendments & IECC Chapter 4 requirements
- Third Party Approval by robust CEC process on base program. Will be submitted for RESNET approval
- Separate Above Code version available

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