# Building energy simulation

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# Introduction

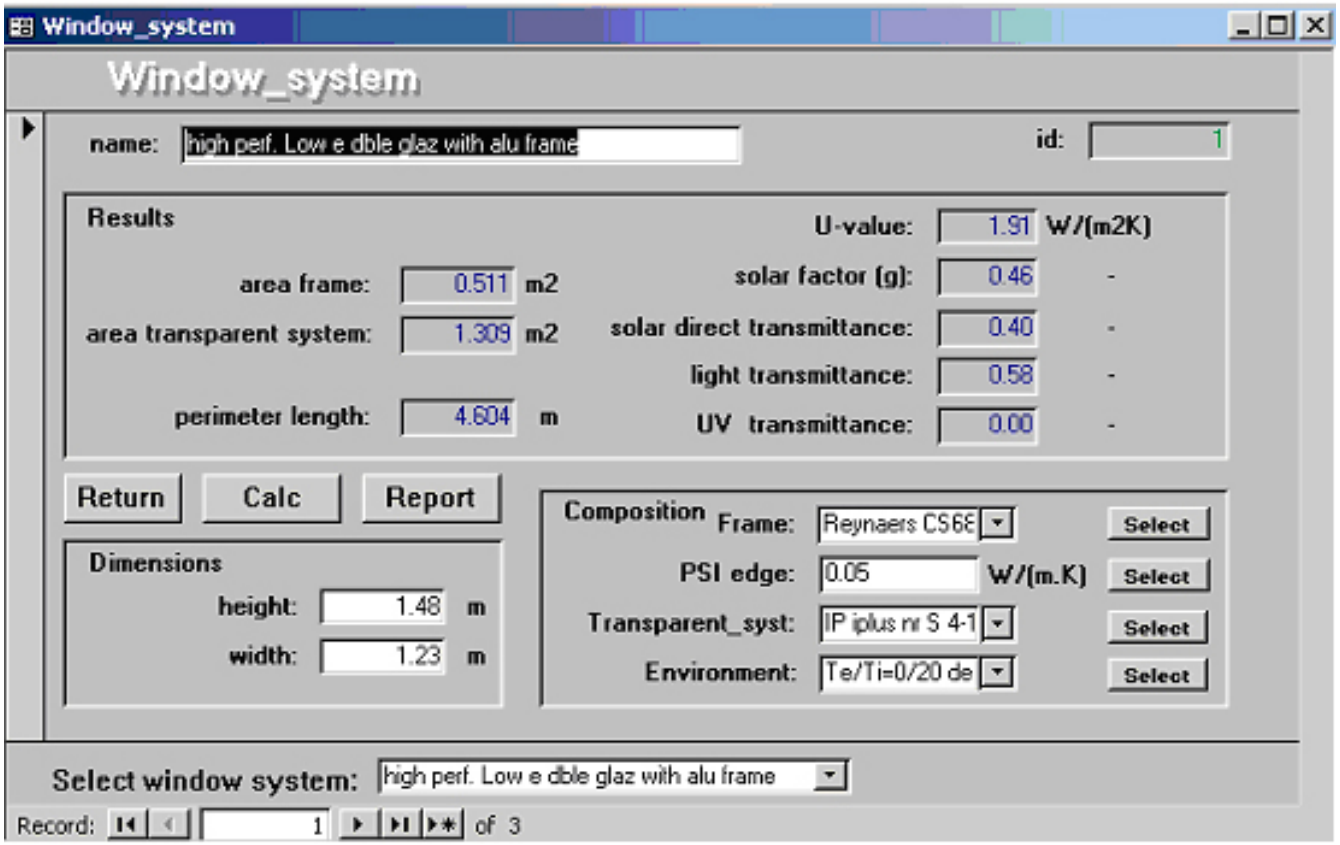
Building energy simulation tools may use different window modeling approaches:

- Simplified thermal and optical properties
  . U-value of the window
  . g-value of the glazing
- Detailed modeling of each component, layer by layer
  . Frame and spacer thermal characteristics
  . Optical properties of each layer of the glazing

→ **WIS can provide data for both situations!**

# Simplified simulation tools

## Window system characteristics given by WIS






WinDat Thematic Network

# Detailed simulation tools

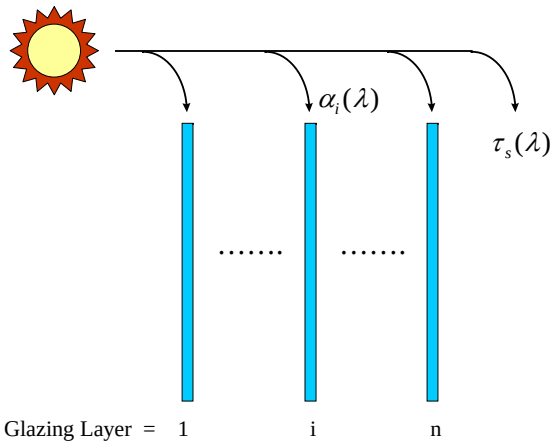
Detailed window system characteristics:

- Frame and spacer thermal transmittance
- Thermal characteristics of the glazing
- Solar and visual characteristics of the glazing
- Angular dependent optical properties of the glazing

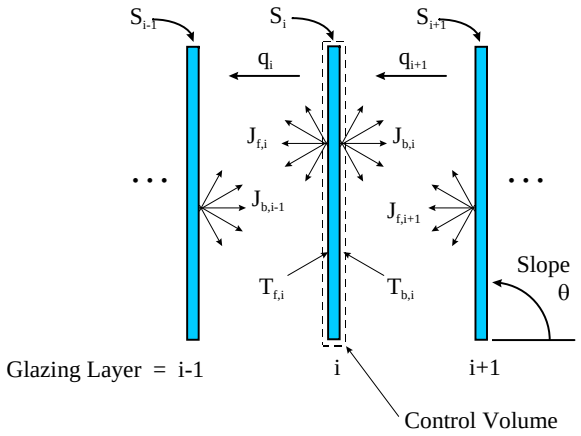
# Detailed simulation tools

## Detailed glazing system model

### Optical model




### Thermal model



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# Detailed simulation tools

## WIS output data report file (txt)

--- Registered WIS user ---
Registered organisation : WindatTest
Registered user name : test_user

--- Report transparent system : 2IV (4/14Ar/4E4 ---

--- Basics (key thermal and solar properties) ---

name transparent system : 2IV (4/14Ar/4E4
U-value : 1.14 [W/(m2.K)]
solar factor (g) : 0.645 [-] (total solar energy transmittance)

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# Output data conversion

Example for TRNSYS (**Multi Band Calculation)**
Unit System : SI
Name : TRNSYS 14.2 WINDOW LIB
Desc : Waermeschutzglas, 0.7, Krypton
Window ID : 4001
Tilt : 90.0
Glazings : 3
Frame : 11 2.270
Spacer : 1 Class1 2.330 -0.010 0.138
Total Height: 1219.2 mm
Total Width : 914.4 mm
Glass Height: 1079.5 mm
Glass Width : 774.7 mm
Mullion : None

| Gap | Thick | Cond | dCond | Vis | dVis | Dens | dDens | Pr | dPr |
|---|---|---|---|---|---|---|---|---|---|
| 1 Krypton | 8.0 | 0.00860 | 2.800 | 2.280 | 7.500 | 3.740 | -0.0137 | 0.660 | 0.00002 |
| 2 Krypton | 8.0 | 0.00860 | 2.800 | 2.280 | 7.500 | 3.740 | -0.0137 | 0.660 | 0.00002 |
| 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 4 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 5 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

| Angle | 0 | 10 | 20 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | Hemis |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Tsol | 0.268 | 0.270 | 0.263 | 0.253 | 0.243 | 0.223 | 0.183 | 0.116 | 0.042 | 0.000 | 0.207 |
| Abs1 | 0.327 | 0.330 | 0.339 | 0.345 | 0.347 | 0.351 | 0.367 | 0.380 | 0.313 | 0.001 | 0.347 |
| Abs2 | 0.066 | 0.066 | 0.067 | 0.068 | 0.070 | 0.071 | 0.070 | 0.064 | 0.051 | 0.000 | 0.067 |
| Abs3 | 0.108 | 0.110 | 0.112 | 0.113 | 0.110 | 0.107 | 0.101 | 0.082 | 0.041 | 0.000 | 0.100 |