EXAMPLE 1-5 The Cost of Heat Loss through a Roof

Modelica code

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model Example_1_5 "The Cost of Heat Loss through a Roof"
  import Modelica.SIunits;
  import Modelica.SIunits.Conversions.NonSIunits;

  constant Real R = 287 "Gas constant ((Pa m^3)/(Kg K))";

  parameter SIunits.Length              L1(min=0) =          6    "Lenght (m)";
  parameter SIunits.Length              L2(min=0) =          8    "Lenght (m)";
  parameter SIunits.Length              tck(min=0) =         0.25 "Tickness (m)";
  parameter SIunits.ThermalConductivity k(min=0) =           0.8  "Th. cond. (W/(m K))";
  parameter NonSIunits.Temperature_degC T_in(min=-273.15) =  15   "Inner temp. (C)";
  parameter NonSIunits.Temperature_degC T_out(min=-273.15) = 4    "Outer temp. (C)";
  parameter SIunits.Time                dt(min=0) =          10   "Time interval (h)";
  parameter Real                        cost_e(min=0) =      0.08  "Cost (dollar/kWh)";

  output SIunits.Area                   A     "Area (m^2)";
  output SIunits.TemperatureDifference  dT    "Temperature difference (C)";
  output SIunits.HeatFlowRate           Q_dot "Heat flow rate (W)";
  output Real                           Q     "Heat loss (Wh)";
  output Real                           cost  "Cost (dollar)";

equation
  A     = L1*L2;
  dT    = T_in - T_out;
  Q_dot = k*A*dT/tck;
  Q     = Q_dot*dt;
  cost  = Q*cost_e/1000;

end Example_1_5;
```