Brandenburgische
Technische Universität
Cottbus - Senftenberg

# Energy systems modelling

## Tutorial 2

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# Some more useful features…

i. Variable attributes
ii. $-operator
iii. Solving model in loops
iv. Report parameters

# Some more features: $-operator



The dollar operator can be introduced in GAMS for a number of contexts.

- ✓ Conditionally execute an assignment

```
A$(b gt 0) = 20;
```

- ✓ Conditionally add a term in sum or other set operation

```
z = sum(i$(y(i) gt 0), x(i));
```

- ✓ Conditionally define an equation

```
Equation1(i)$(ii).. sum(i, a(i)*x(i)) =e= 1;
```

- ✓ Conditionally include a term in an equation

```
Equation1 .. x + y $(a gt 0) =e= 1;
```

# Conditionally execute an assignment

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- ✓ Conditionally execute an assignment

```
A$(b gt 0) = 20;
```

```
parameter
    flag        put 1 when capacity unlimited;
    flag        = 1;

cap('x1')$(flag=1) = 1e6;

solve ESM_is_a_simple_course using lp minimizing z;
  display x.l, z.l;
```

# Conditionally add a term in sum or other set operation

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- ✓ Conditionally add a term in sum or other set operation

```
z = sum(i$(y(i) gt 0), x(i));
```

```
SET
    i_conv(i) /x2/;

Parameter
    cap_conv capacity of conventional techs;

cap_conv = sum(i$i_conv(i), cap(i));

display cap_conv
```

# Conditionally define an equation

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✓ Conditionally define an equation

Equation1(i)$(ii).. sum(i, a(i)*x(i)) =e= 1;

```
SET
    i_emergency(i) /x2/;

equation
    cons_conv(i) new constraint;

cons_conv(i)$i_emergency(i).. x(i) =l= cap(i)*0.5;

model ESM2 /all/;
solve ESM2 using lp minimizing z;
    display x.l, z.l, dem.m. cons.m;
```

# Conditionally include a term in an equation

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- ✓ Conditionally include a term in an equation

```
Equation1 .. x + y $(a gt 0) =e= 1;


parameters
        cost_co2      guess what's that?
        flag          put 1 if  we include co2 cost;
        cost_co2      = 30;
        flag          = 1;

        c('x2') = 70 + cost_co2$(flag=1);

solve ESM_is_a_simple_course using lp minimizing z;
     display x.l, z.l;
```

## Some more useful features…

i. Variable attributes
ii. $-operator
iii. Solving model in loops
iv. Report parameters

## A few last notes…

i. What are the GAMS project files?
ii. What files are created when you run a model?
iii. GAMS GUI vs GAMS Studio vs text editors

**Assignment 1: find in Moodle**

…send your GAMS code and a report paper until 28.11.2019