



*Developing an LCA software in Hungary for a  
more sustainable production*

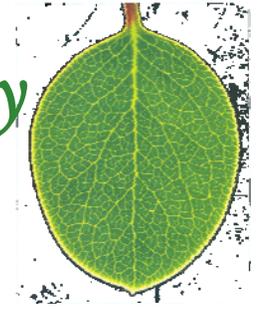


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*27th LCA Discussion Forum  
November 17, 2005, Swiss Federal Institute of Technology Zürich*



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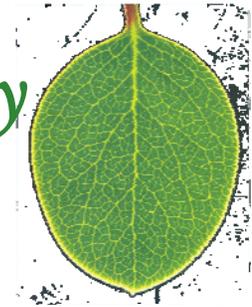


### *SOME WORDS ABOUT PREMISES...*

- In Hungary LCA application in children shoes
- Softwares developed in other countries could appoint false results



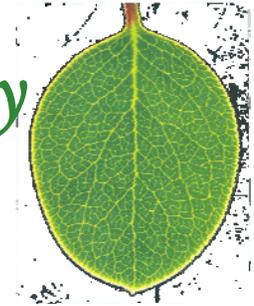
## *Developing an LCA software in Hungary for a more sustainable production*



- „Development of a national LCA database for supporting environmentally sound development of Hungarian enterprises”
- Bay Zoltán Foundation for Applied Research
- University of Miskolc
- Economic Competitiveness Operative Program (GVOP)
- Finance of the project:
  - *75% EU,*
  - *25% Hungarian government*



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### ■ **Keynote:**

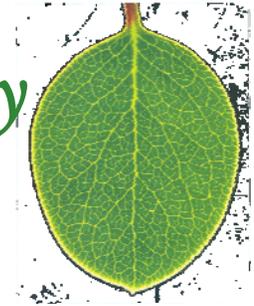
- Results in international research (SimaPro, GaBi)
- Consideration of Hungarian conditions

### ■ **Objectives**

- On-line database
- Focusing to
  - Waste management
  - Energy sector
- *normalisation data ???*
- To use in education and research

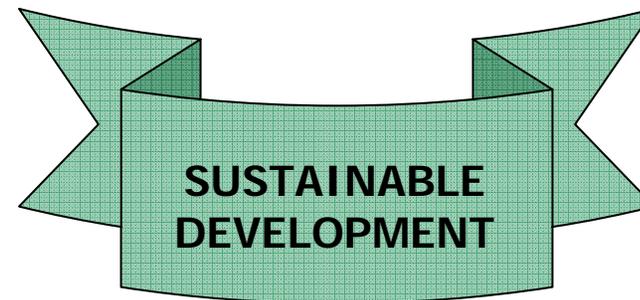


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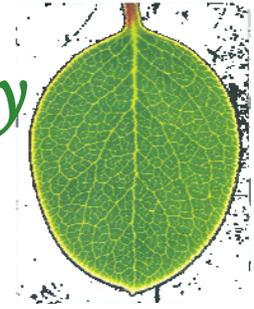
## *TARGET AUDIENCE*

- Environmental conscious customer
- Environmental conscious producer





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## *PROCEDURE OF THE RESEARCH*

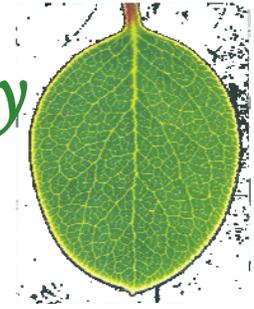
- Estimating domestic energy-sector
- Data collection
- Determining system boundaries
- Function of production system
- Life cycle inventory

- Transportation
  - Road transport
  - Railway
  - Air
  - Waterway
  - Hydraulic

Transport kilometre, materials



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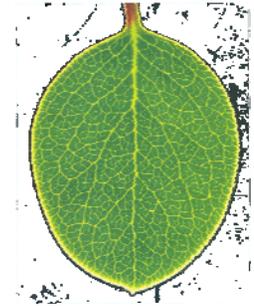


### *CLASSIFICATION OF HUNGARIAN POWER PLANTS:*

- Nuclear Power Plants
- Coal – fired power plants
- Natural gas- and oil fired power stations
- Natural gas burning power plants (peak-load plants)
- Wind energy power plants
- Incinerators
- Biomass burning power plants



# NUCLEAR POWER PLANT PAKS



## Input:

- Fuel elements
- Adsorbent rod
- Saline solutions for regeneration of ion-exchange resins
- Condenser water
- Chemicals, greasing materials

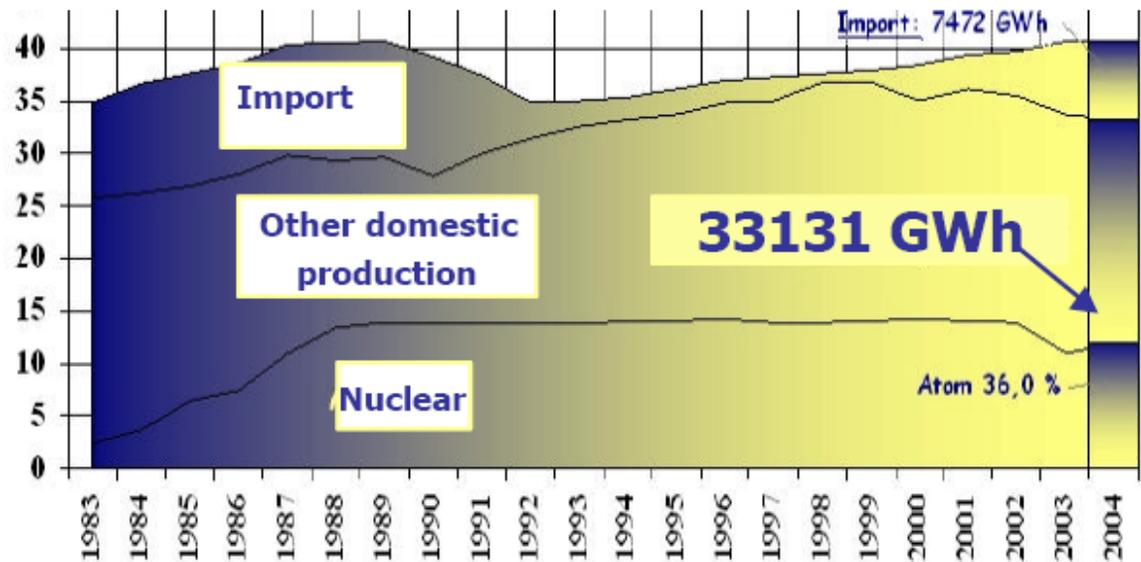
## Output:

- Electricity, heat
- Nuclear wastes
- Condenser water
- Spent oils
- Noise and vibration

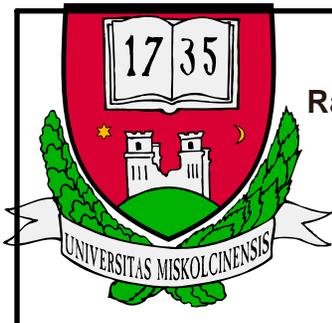
Total capacity: **1729 MW**

Participation from Hungarian electricity production: **39,1 %**

## Hungarian electricity production



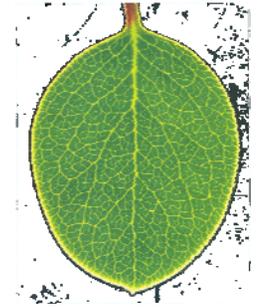
source: Nuclear Power Plant, Paks

 Radionuclide	<i>Paks</i> [GBqGW <sub>e</sub> <sup>-1</sup> év <sup>-1</sup> ]	<i>PWR</i> [GBqGW <sub>e</sub> <sup>-1</sup> év <sup>-1</sup> ]
	2003	1995-1997
<b>Emissions to air</b>		
Total aerosol	4,4 x 10 <sup>0</sup>	1,3 x 10 <sup>-1</sup>
<sup>131</sup> Iodine equivalence	2,6 x 10 <sup>2</sup>	1,7 x 10 <sup>-1</sup>
Total inert gas	3,1 x 10 <sup>5</sup>	1,3 x 10 <sup>4</sup>
Total tritium	5,0 x 10 <sup>3</sup>	2,4 x 10 <sup>3</sup>
Total radiocarbon	4,3 x 10 <sup>2</sup>	2,2 x 10 <sup>2***</sup>
<b>Fluent emissions</b>		
Corrosive and cleavageproduct	5,8 x 10 <sup>-1</sup>	8,1 x 10 <sup>0</sup>
Tritium	1,0 x 10 <sup>4</sup>	1,9 x 10 <sup>4</sup>

Source: UNSCEAR Report, 2000



## COAL BURNING POWER PLANTS

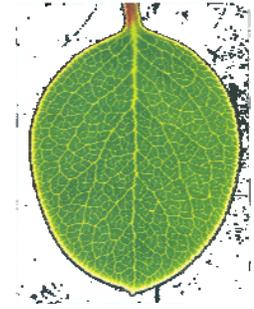


### *Input:*

- *Fuel: black coal, brown coal, lignite*
- *Industrial water*
- *Lime*
- *Ammonia or methane*
- *Electric energy*
- *Subsituation of the used up ion exchange resin*
- *lubricants*

### *Output:*

- *Slag*
- *Dust-ash*
- *Gypsum*
- *Used up ion-exchange resin*
- *heat*



- *Natural gas firing: peak – load plant*

- *Hydroelectric power stations  
(hidroaccumualtion plants,  
hidroaccumlationless plants)*



*Input: water, oil*

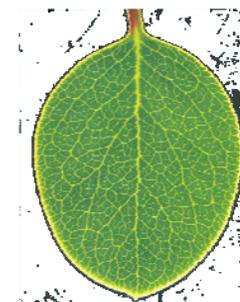
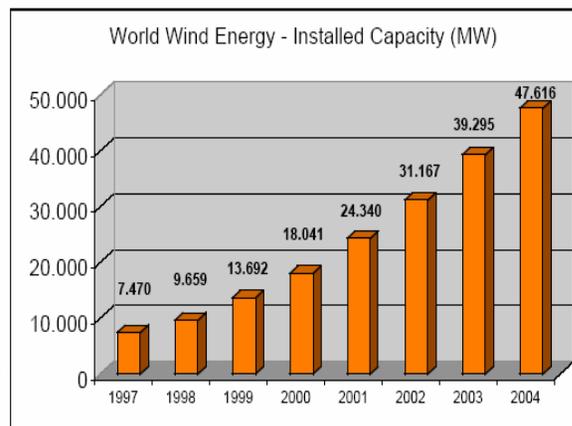


*Output: water, slop oil, (methane)*

- *Incinerator*

- *Biomass burning plants*

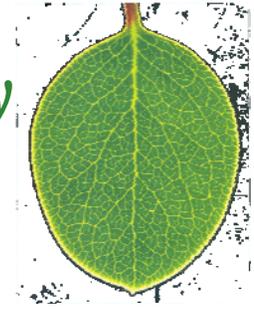
- *Silvicultural and woodworking waste*
- *Secondary products and wastes of traditional agricultural corps*
- *Cultivated plants with the aim of energetic*
- *Secondary biomass*
- *biogas*



Wind power plants	Capacity (kW)	Date of commissioning	Produced electricity (kWh)	Avoided emissions		
				CO <sub>2</sub> (t)	NO <sub>x</sub> (kg)	SO <sub>x</sub> (kg)
Inota power plant	250	2000	1013840	983,4	740	1500
Kulcs power plant	600	2001	3858456	3693	2779	5635
Monosszolnoki power plant	2x600	2002.12.20-2004.12.31.	1894720 (hours run:12494) 1912730 (hours run :12312)	3693	2779	5635
Mosonmagyaróvári power plant	2x600	2003.07.01-2004..12.3	1448234 (hours run:10629) 1456215 (hours run:10699)	2817	2120	4299

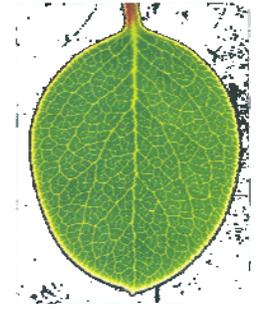


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## *NEXT STEPS*

- *Parameters and trends of Hungarian energy-sector*
- *input – output analyses of energy production*
- *Developing normalization data regarding to energy sector*
  
- *Parameters and trends of waste management*
- *Waste management systems and specific processes*
- *Creating normalization data regarding to waste-management sector*
  
- *Life cycle assessment for energy and waste systems*
- *Web development, software development*



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*Thank you for your attention!*

