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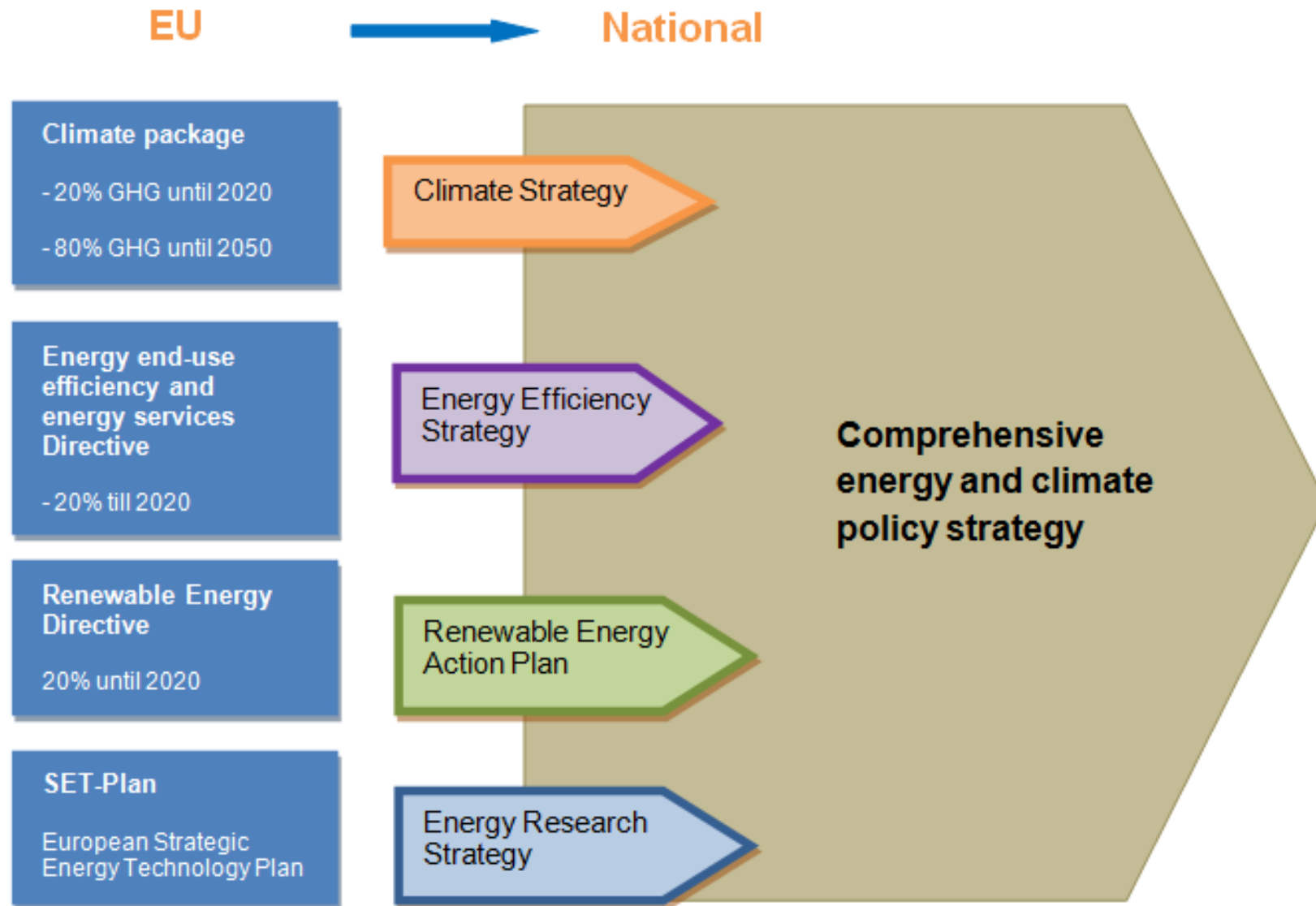
MAKING KNOW-
HOW WORK.

Energy efficiency in SMEs

Best practice and lessons learned from Austria

Andreas Karner, ConsPlusUltra Ltd.
Accra, 30.10.2012

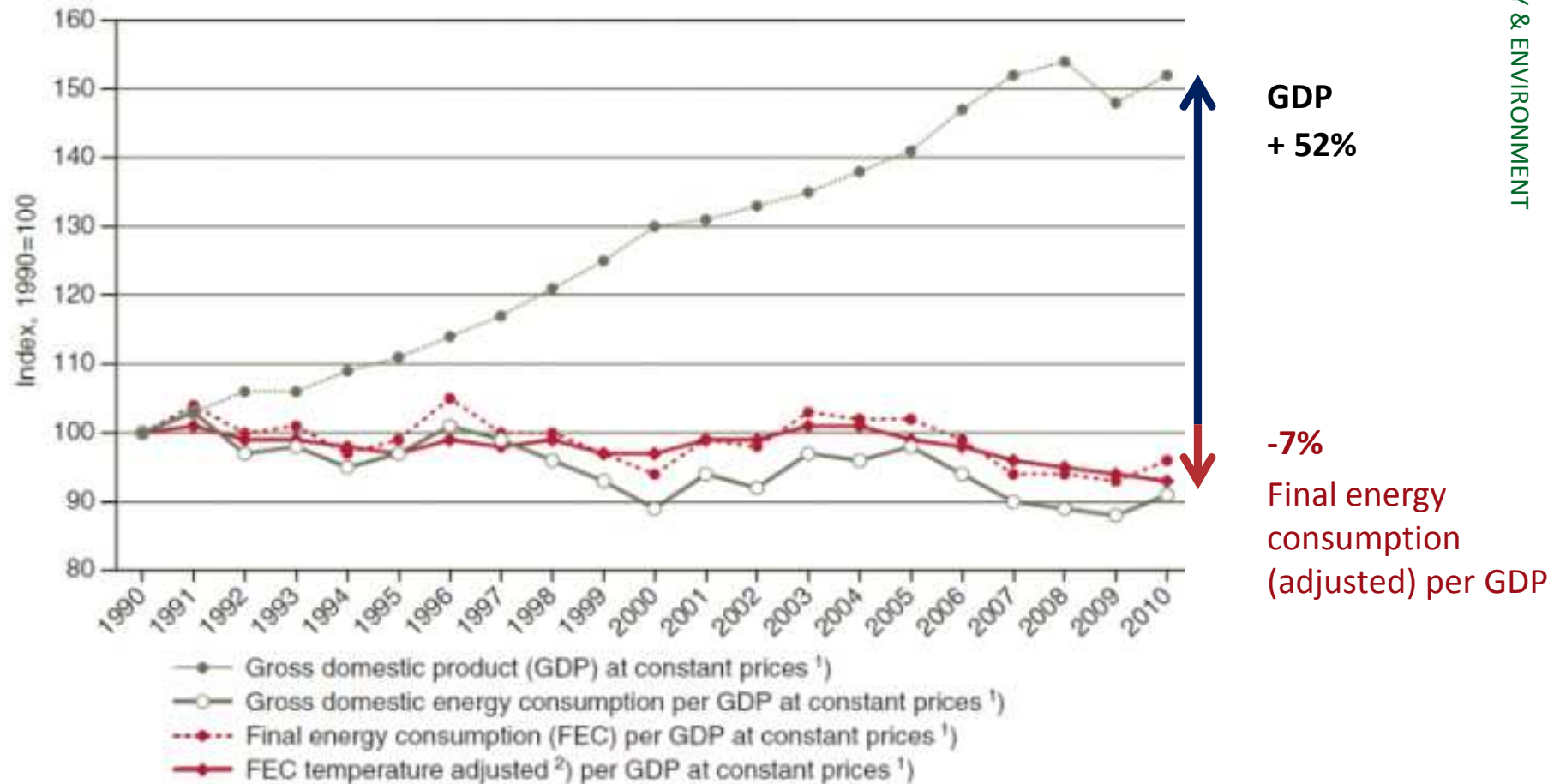
The European Climate and Energy Package for 2020



Energy intensity in Austria



ENERGY & ENVIRONMENT

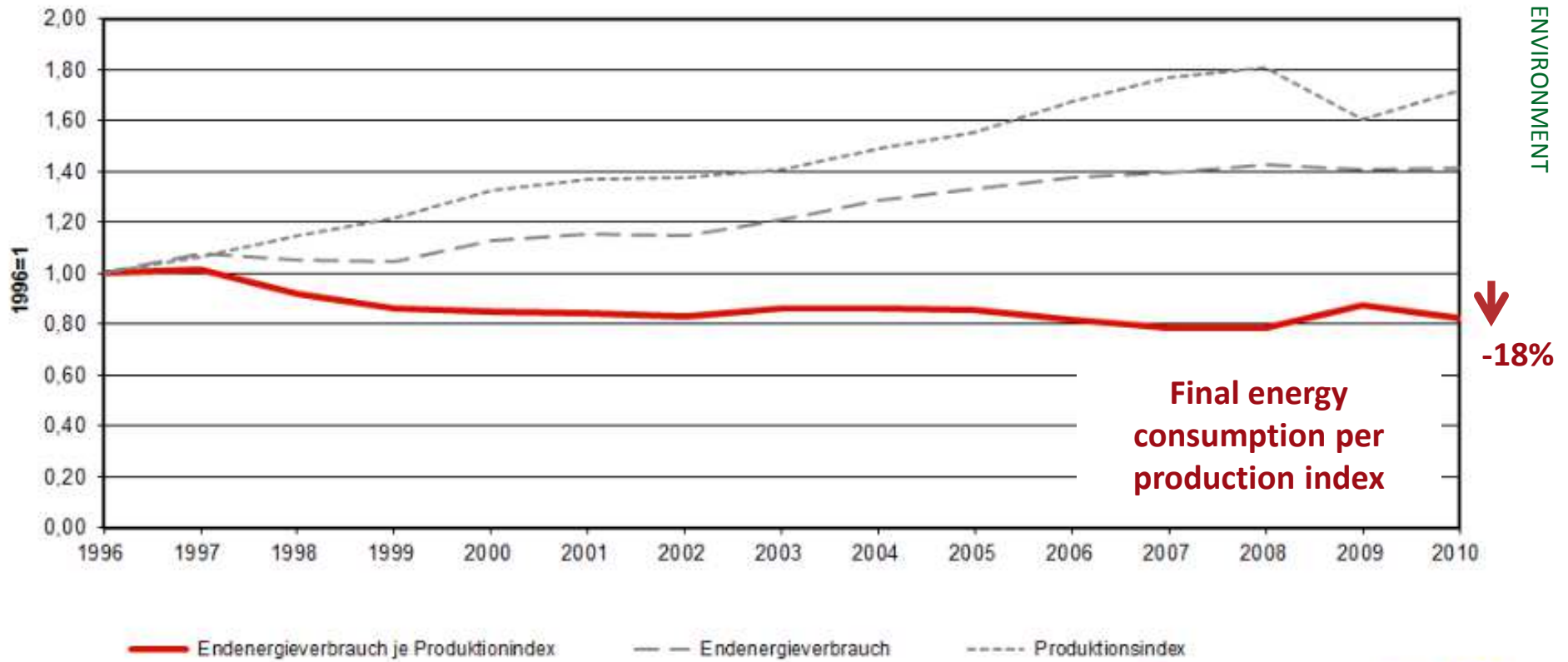


S: STATISTICS AUSTRIA, National accounts, Energy statistics: Energy balances 1970 to 2010. Compiled on 25 January 2012. - 1) Volume chained series, reference year = 2005. - 2) The adjustment of temperature applies to the energy consumption of space heating and cooling.

Energy intensity of production sector



ENERGY & ENVIRONMENT



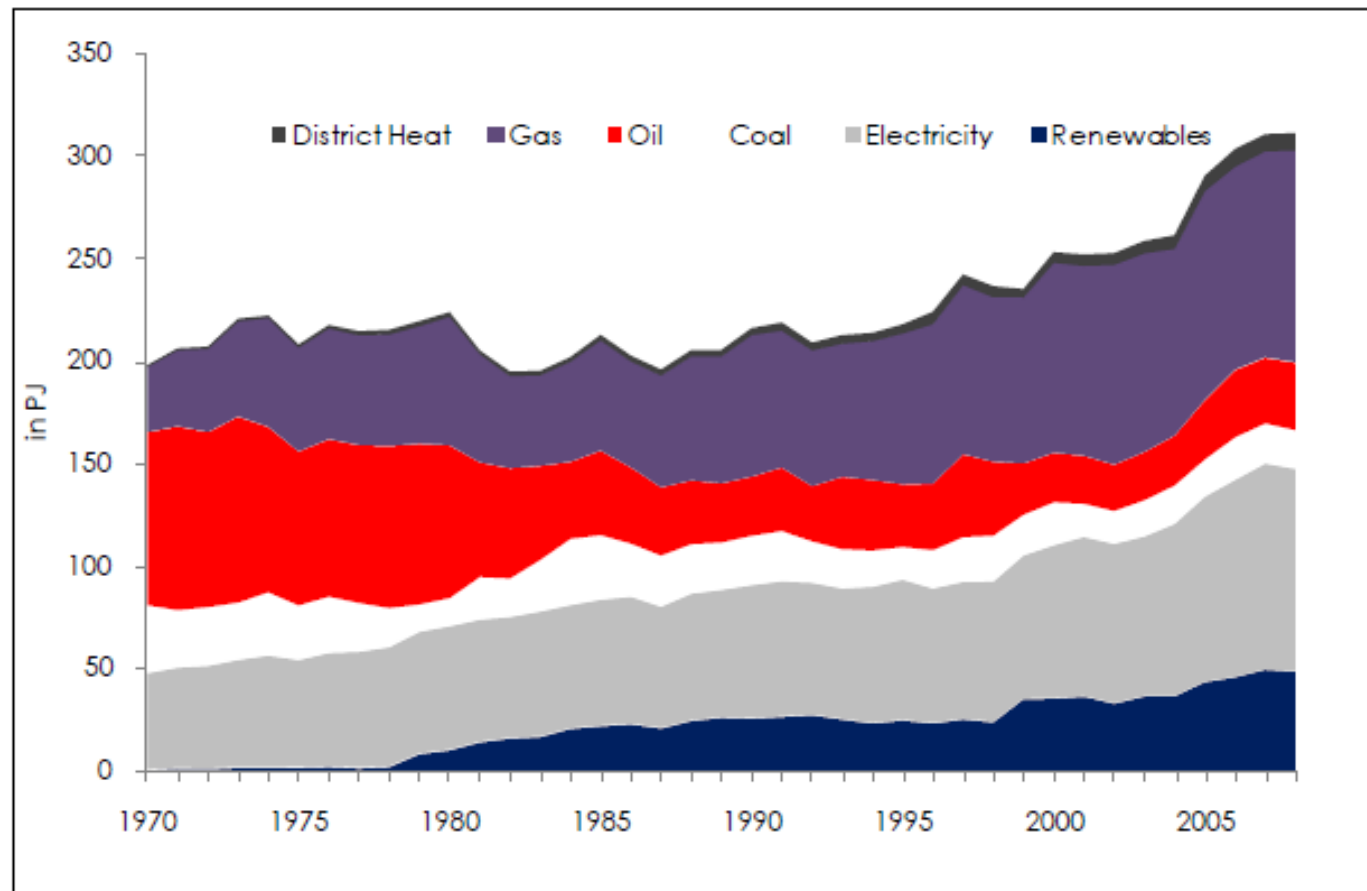
Datengrundlagen: Statistik Austria; Berechnungen: Österreichische Energieagentur; erstellt am 21.05.2012



Austria: Final Energy Consumption



+ FEC of Production sector (in PJ)

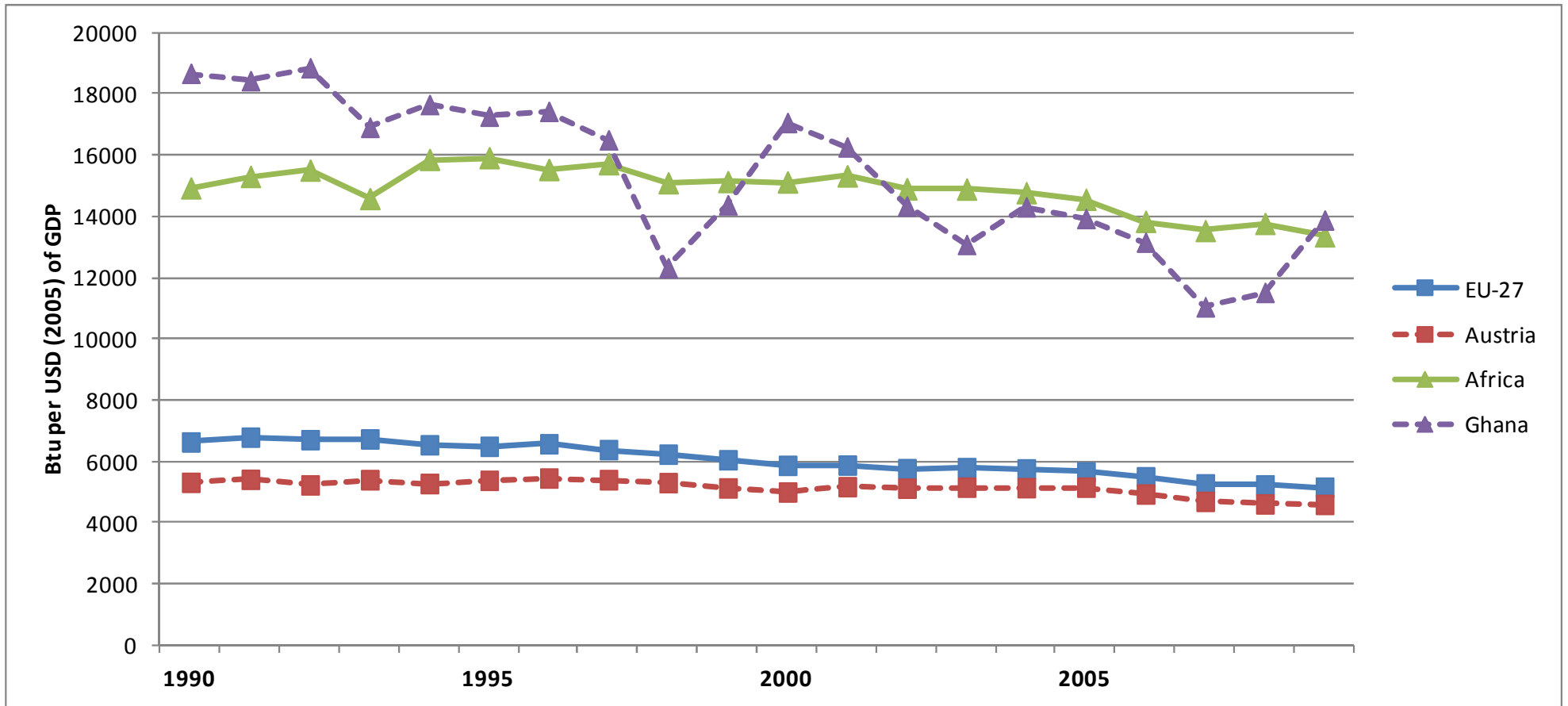


Source: Statistics Austria (2009)

Comparison: energy intensity EU - Africa



+ Total Primary Energy Consumption per Dollar of GDP



Source: IEA (2011)



Typical energy processes in industry / SMEs

- + Drying processes (liquids & solids - e.g. paper, textiles, biomass)
- + Pasteurization and sterilization (e.g. food industry)
- + Cleaning processes (e.g. textiles, metal parts, chemicals)
- + Energy intensive processes (e.g. melting, bleaching, welding)
- + General heat treatment (e.g. food, plastics industry)
- + Heating of production halls & buildings
- + Cooling, freezing, air-conditioning (e.g. cold storage, buildings)

Energy applications



Main differentiation:

+ Heat applications

- heating systems (boilers, heat distribution, control)
- hot water
- process heat
- conventional steam & hot gas processes



+ Electricity applications

- lighting
- compressed air
- pumping
- ventilation, ventilators
- electric engines / electric propulsion systems
- refrigeration
- cooling, air conditioning
- ICT & office appliances



Energy efficiency - Heat applications



+ Process heat

Heat for *industrial and commercial production*, such as drying, cooking, melting, forging, etc., generated by combustion processes or electricity and through waste heat.

+ Possible alternative: Solar thermal energy

- application in low- to medium temperature level processes (up to 150°C)
- High potential: almost 30% of thermal energy demand in EU industry is below 100°C

Solar thermal potentials in industry processes

Industry	Process	Temperature level [°C]
Foods and beverages	drying	30 – 90
	washing	40 – 80
	pasteurizing	80 – 110
	cooking	95 – 105
	sterilizing	140 - 150
	heat treatment	40 – 60
Textile industry	washing	40 – 80
	bleaching	60 – 100
	dyeing	100 – 160
Chemical industry	cooking	95 – 105
	distilling	110 – 300
	var. chemical processes	120 – 180
All sectors	preheating of boiler water	30 - 100
	heating of production halls	30 - 80

Energy efficiency - Heat applications



+ Best practice: Solar energy in pre-cast concrete production

- Initial situation:
 - ♦ Heating oil 160,000 ltr/a (for ageing of concrete panels, ca. 40-45°C)
- Implemented measures:
 - ♦ Solarthermal collector area: 315 m²
 - ♦ buffer storage capacity: 36,000 liters
 - ♦ solar proportion: 30%
 - ♦ heat production combined with biomass (400 kW, wood chips)

Results:

- Energy savings 158.000 kWh/yr
- Cost savings 25.000 Euro/yr
- Cost reduction 70%
- Investment 300.000 EUR
- Payback time < 8 years
- Realization 2010



Source: Fa. Leitl

Energy efficiency - Electricity applications



+ Compressed air for

- Cleaning, vacuuming, blowing, cooling, pressurized equipment (drilling equipment, angle grinding, vanishing, etc.)
- In average 10% of electricity demand in enterprises, potential **savings between 30-40%**

Costs of compressed air loss

Hole diameter in mm	Air loss at 8 bar [l/mm]	Energy loss [kW]	Costs [€/a]	
			8000 hours of operation	4000 hours of operation
1	75	0,6	672	336
1,5	150	1,3	1.456	728
2	260	2,0	2.240	1.120
3	600	4,4	4.928	2.464
4	1100	8,8	9.856	4.928
5	1700	13,2	14.812	7.406

+ Pumping

- Pumping systems are responsible for about a quarter of the world's electricity consumption
- Here **savings of up to 40%** over an average lifespan of 15-20 years are possible.



Energy efficiency - Electricity applications



+ Best practice: Integrated Energy concept in food industry (meat production)

- Initial situation:
 - ♦ Consumption of 6 GWh/yr natural gas and 3,5 kWh/yr electricity
- Implemented measures:
 - ♦ Lighting: conventional ballasts were replaced by electrical ballasts,
 - ♦ Pumping system was changed from high to low pressure,
 - ♦ Distribution lines were isolated,
 - ♦ Pressure steam for meat smoking process was changed from high to low pressure steam,
 - ♦ Separation of warm and cold areas, cold storage doors have been changed.

Results:

- Energy savings 1.297.700 kWh/a
- Cost savings ca. 70.000 Euro
- Cost reduction 13%
- Investment 83.500 EUR
- Payback time 12 - 60 months
- Realization 2008-2009



Source: Fa. Krainer

Energy efficiency - Electricity applications



+ Best practice: Optimisation of the lighting system in a production hall (packaging industry)

- Initial situation:
 - ◆ Total energy consumption of 825,000 kWh / year
- Implemented measures:
 - ◆ Replacement bulbs
 - new triphosphor tubes
 - Light quality has been increased, maintenance costs reduced
 - ◆ Central power saving system
 - power reduction mode leads to savings of ca. 35 %

Results:

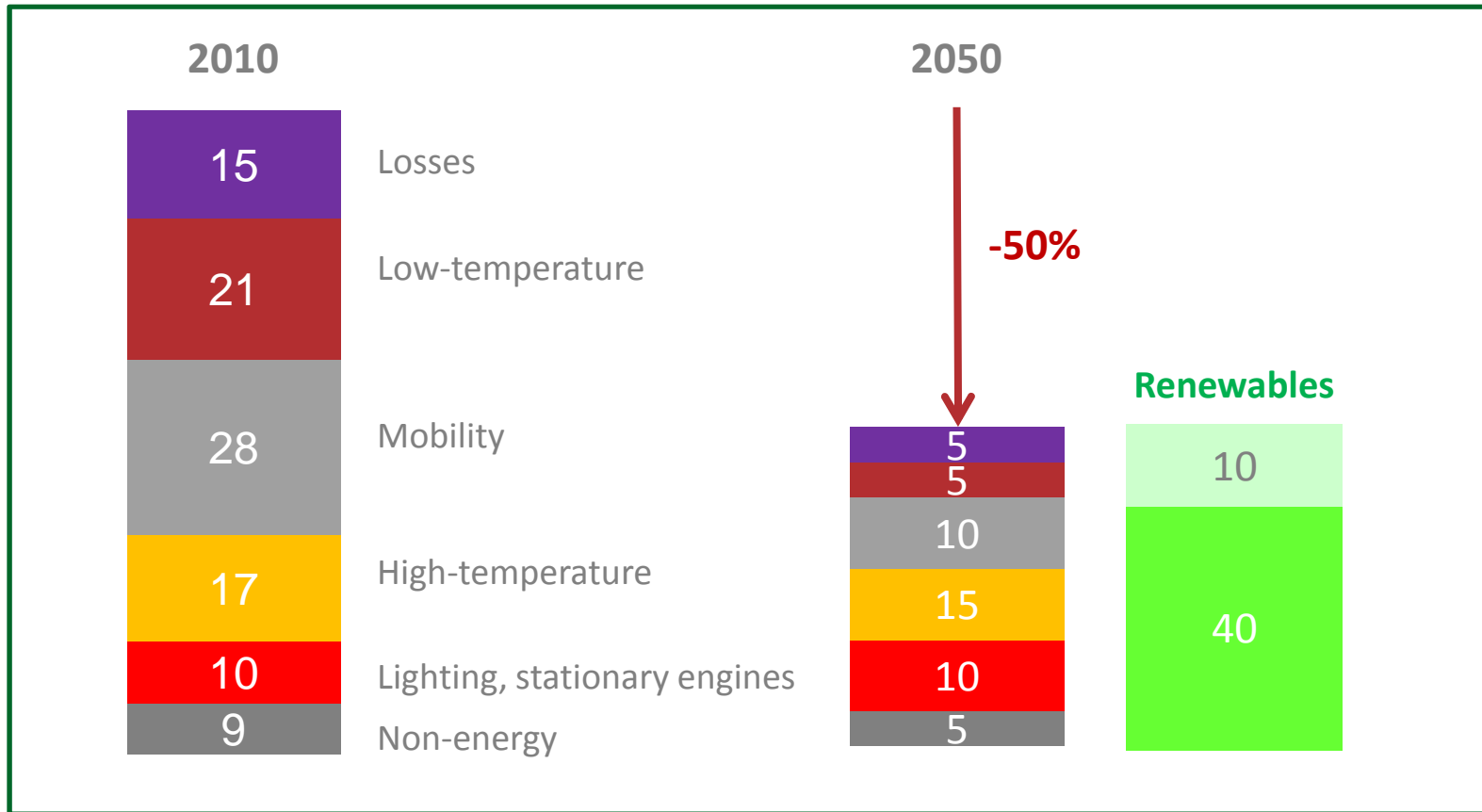
- Energy savings 63.039 kWh/a
- Cost savings 8.055 Euro/year
- Cost reduction 25%
- Investment 26.800 EUR
- Payback time 3 years
- Realization 2010



Vision for 2050



What do we need energy for?



2050: 50% less energy demand and 80% from renewables

Increase energy efficiency in industry / SMEs

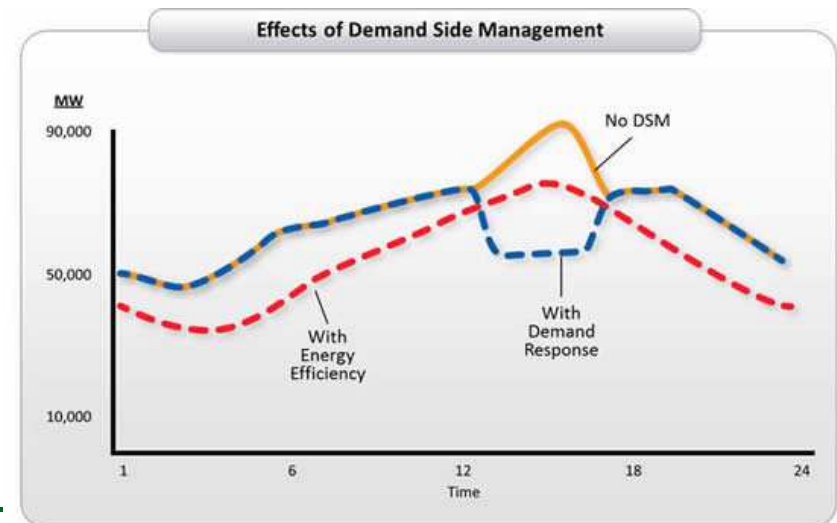


+ Implement energy management systems

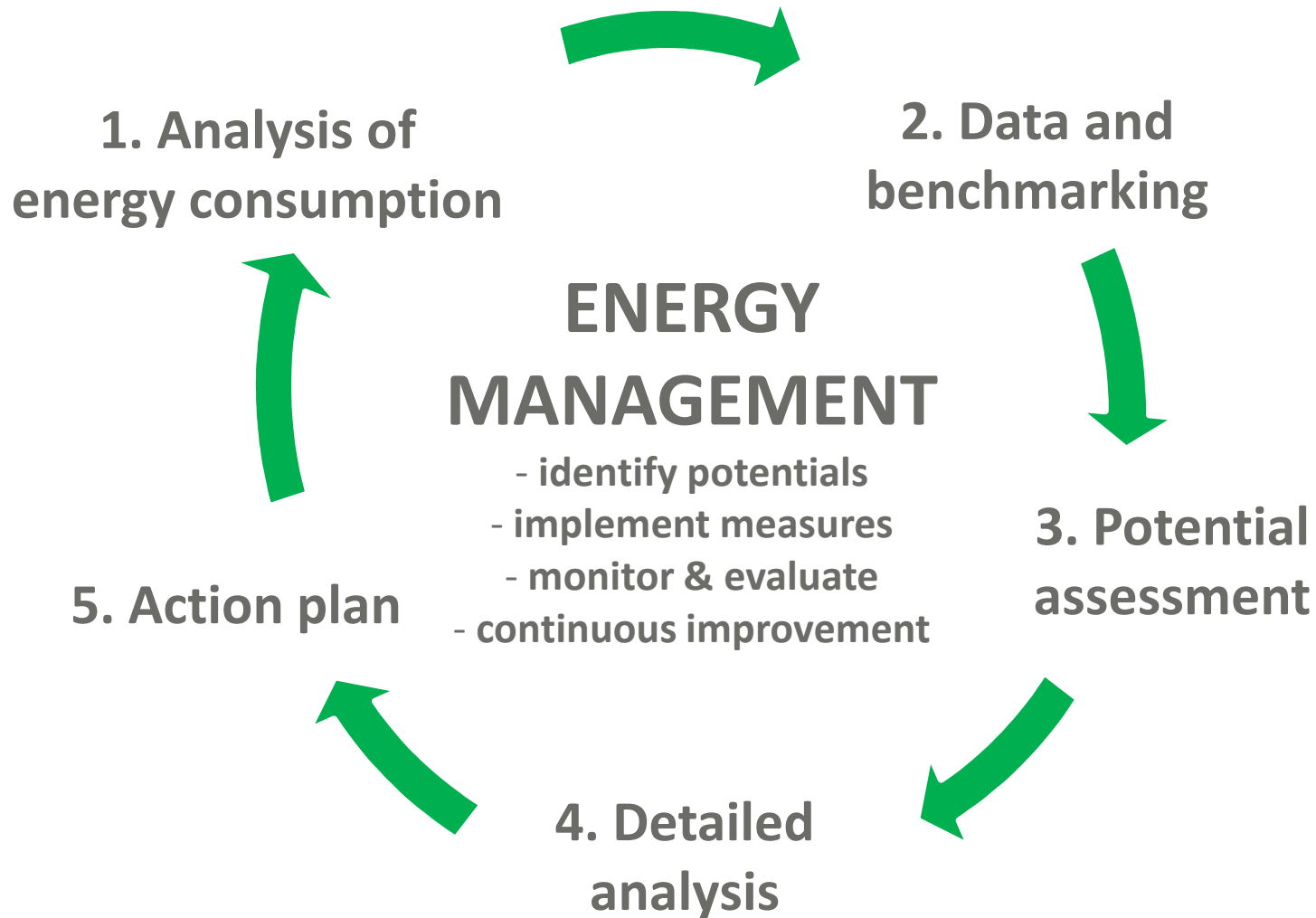
- organizational measures to optimize procedures and methods;
- monitor, control, and optimize the performance of the generation and/or transmission system and of manufacturing processes
- first: demand reduction, second: focus to renewables
- for large industry: adopt international norms (such as ISO 50001) supports organizations in all sectors to use energy more efficiently

+ Demand Side Management

- consume less energy during peak hours
- use efficient equipment and appliances
- improve user behaviour



Energy management cycle



Recommendations for more energy efficiency in industry / SMEs



+ Create energy management best practice

- Energy Audit Schemes
- Energy management certification for larger industries
- Awareness raising through best-practice

+ Promote EE technologies for industrial / manufacturing applications

- establish technology and information base for high potentials
- develop energy concepts for typical manufacturing branches
- promote replication strategies

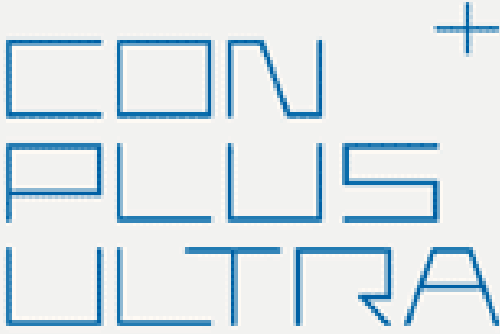
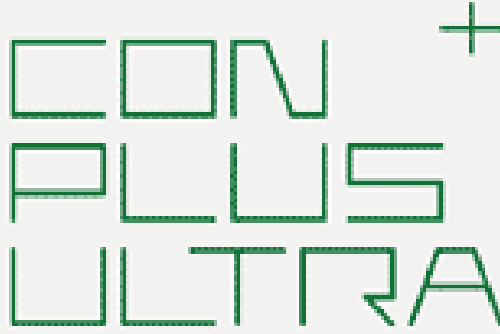
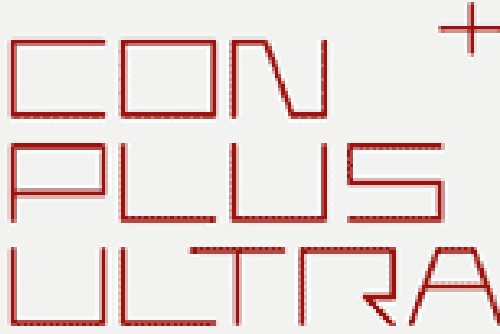
+ Use of new technologies and high efficiency equipments

- Combined heat & power (cogeneration)
- low carbon technologies (renewables for electricity, thermal applications)

ConPlusUltra Services



ENER

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Thank you for your attention!



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