

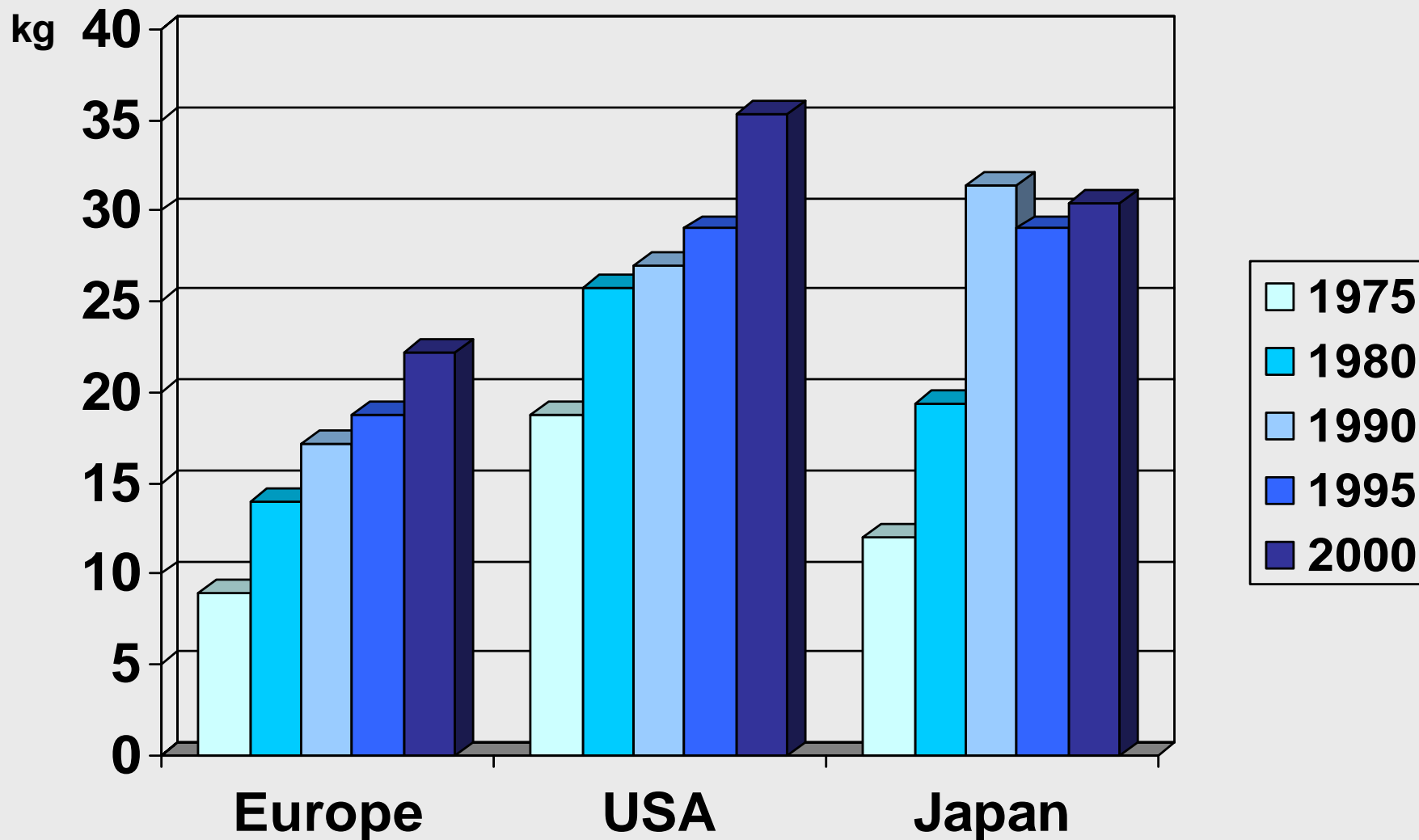
The future of the aluminium industry

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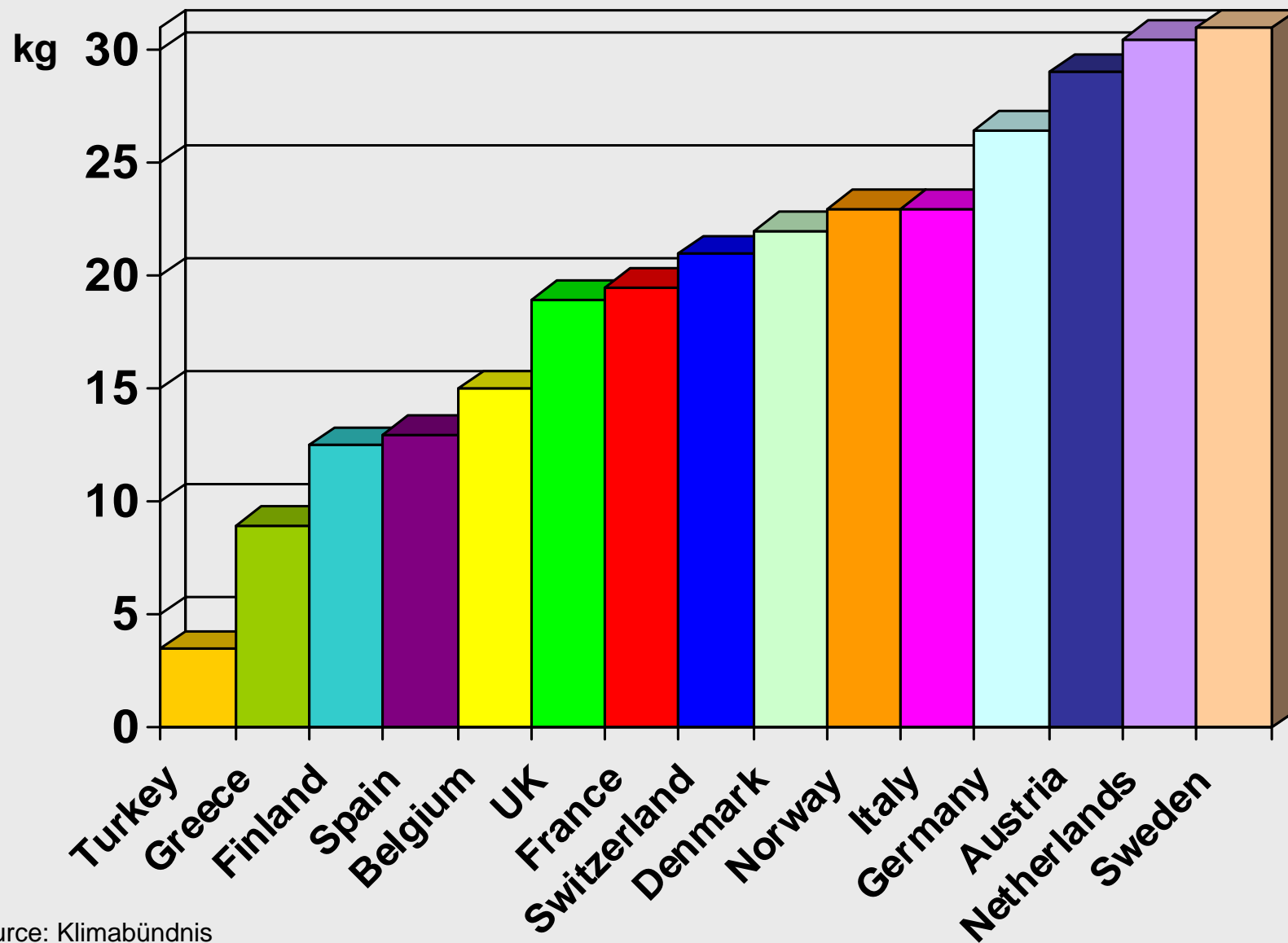
Per-capita total AL consumption by world areas

Evolution 1975 onwards (in kg)



Per-capita total aluminium consumption

Per country in kg (1999)

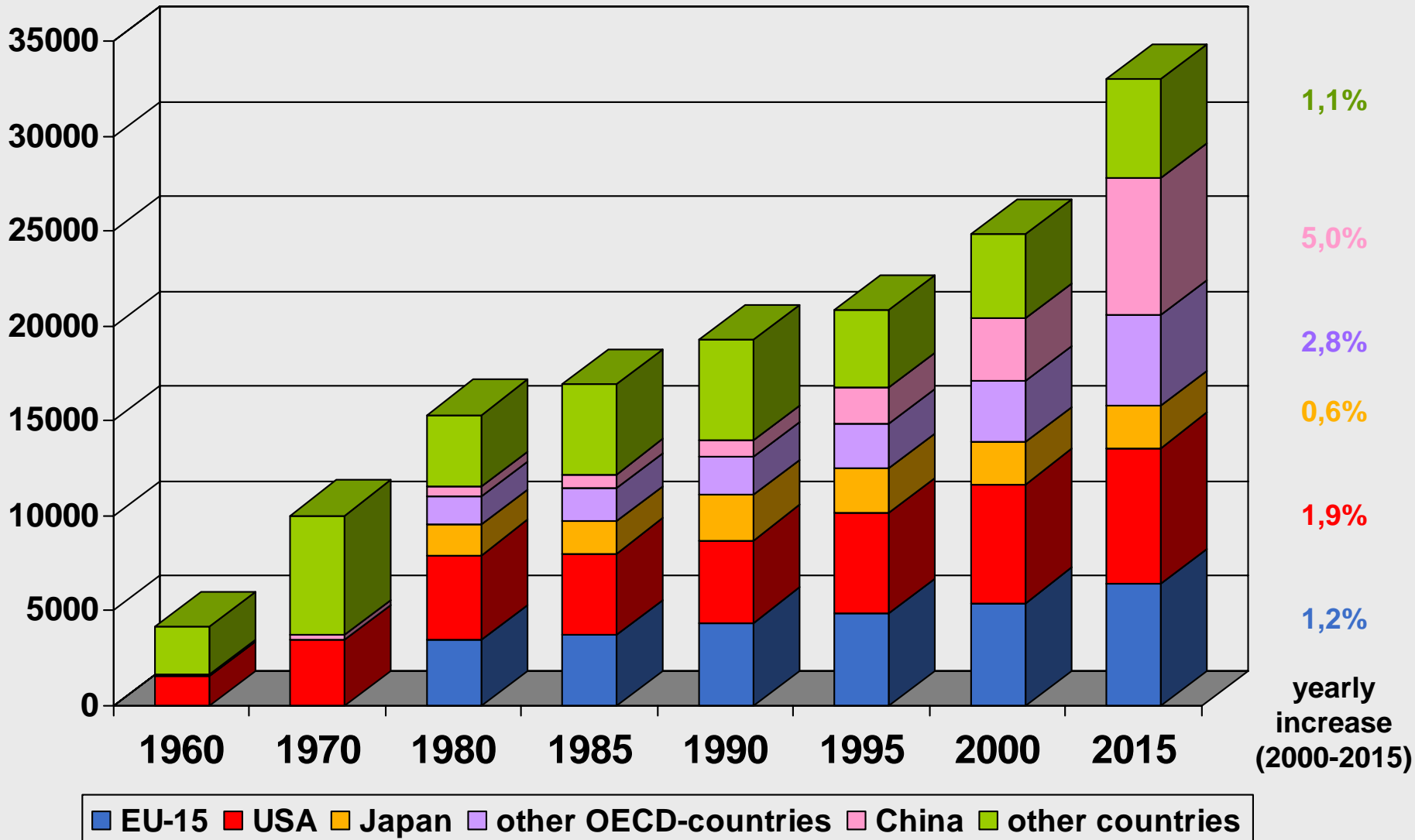


Per-capita metal consumption of aluminium and steel

	2000 (in kg)	2015 (in kg)	yearly increase
Aluminium:			
world	4,1	4,6	0,8%
EU-15	14,4	17,0	1,1%
USA	22,8	22,4	- 0,1%
Japan	17,5	17,2	- 0,1%
Other OECD	9,2	12,5	2,1%
China	2,6	5,1	4,6%
Steel:			
world	142,6	189	1,9%
EU-15	428,8	450	0,3%
USA	482,7	465	- 0,2%
Japan	634,8	600	- 0,4%
Other OECD	349,6	390	0,7%
China	128,0	325	6,4%

Total aluminium metal consumption (in 1.000 t)

World: 4.166 10.027 15.321 16.919 19.275 20.871 24.857 33.000 2,2%



Source: DIW

Potential fields for aluminium

- Automotive industry
- Mechanical Engineering
- Packaging industry
- Construction industry
- Others like electrical engineering, households, offices

Aluminium in the automotive industry

Why to use aluminium in the automotive industry?

- Lower weight than steel
- Sufficient solidity
- Formable
- Corrosion-resistant
- Good in crash tests
- Able to recycling
- Reduces emissions
(20% less weight => 20% less emissions)

And why not?

- Fabrication of primary aluminium is expensive, amortisation after 60.000 to 70.000 km
- Lower weight leads to
 - less solidity
 - thicker plates
- Steel is known since years

Aluminium in the automotive industry

- 1995:
in Europe 60 to 65 kg aluminium per car
in Northern America 90 kg
- 1997:
in Europe about 70 kg aluminium per car
in Northern America between 113 and 135 kg
- 2000:
in Europe about 110 kg aluminium per car
- 2005:
in Europe 130 to 150 kg aluminium per car
others speak of about 120 kg aluminium per car

Aluminium in the car industry today and in future

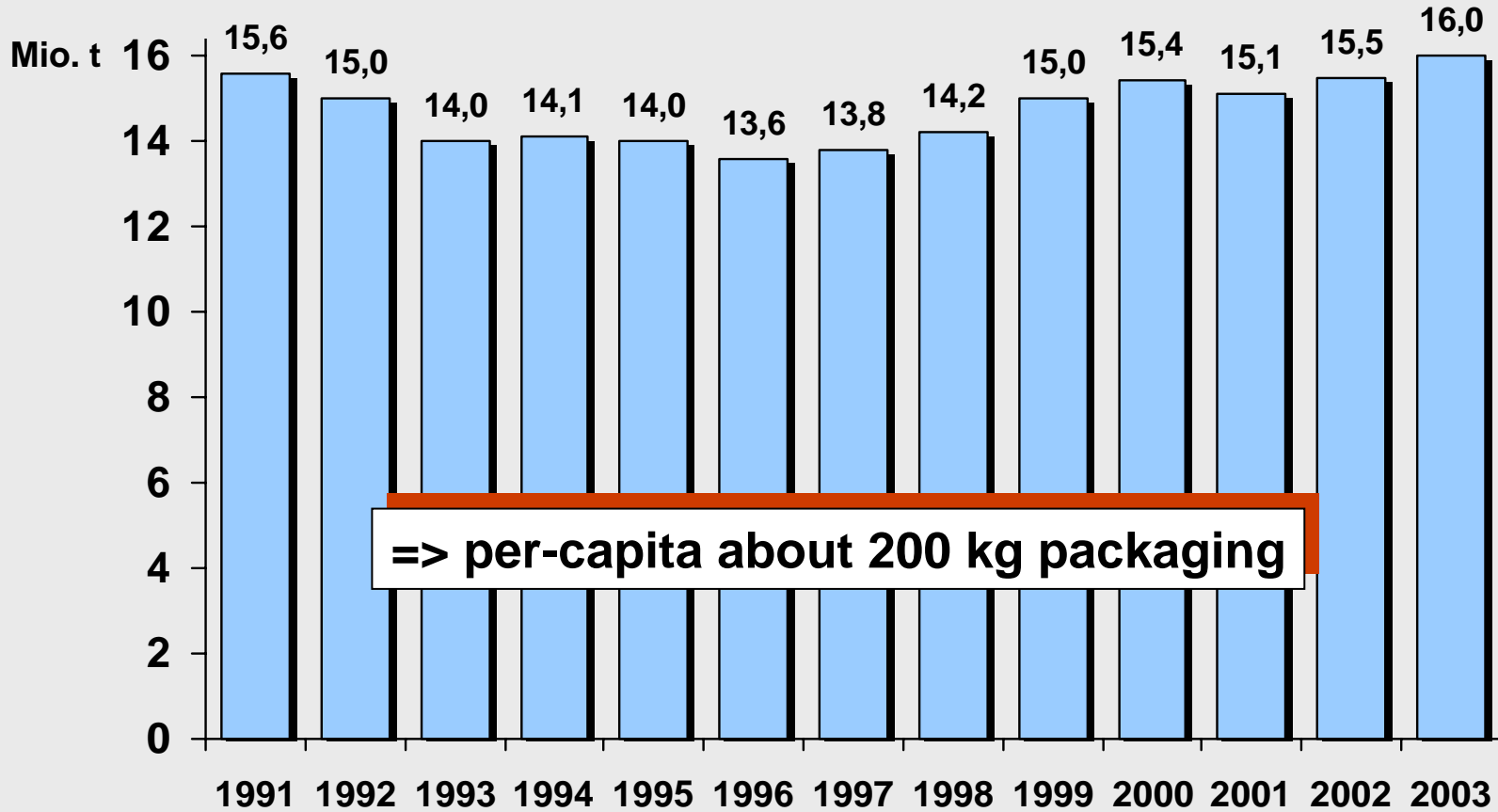
- Europe is the fastest growing region for aluminium use in the automotive market worldwide. This growth can be attributed to the metal's value in boosting fuel economy, performance and safety. Due to the lighter weight of these vehicles, aluminium helps to reduce emissions. Also the high value of aluminium ensures complete recovery and the recycled aluminium is used for automotive components.
- Europe is leading in the innovative use of aluminium closures, body structure and chassis applications – to improve safety and performance of cars. Significant growth is predicted in particular for automotive body sheet.
- The global use for automotive industry is predicted to reach nearly 5,5 million tonnes in 2006. Of this volume 55 percent will be recycled aluminium.

Aluminium in the car industry today and in future (cont.)

- Although only 100.000 vehicles will have a complete aluminium body structure, there will be millions of cars with an aluminium content of more than 200 kg.
- Not only plates, more and more car parts are made of light material like bumpers. 75 percent of cylinder heads and every second engine block are manufactured using aluminium.
- There is a tendency to light weighted cars (less petrol, less emissions, less corrosion).
- Cars get bigger and bigger (limousines, SUVs, vans, even smaller models get larger), should not be too heavy.
- There is a trend to a second or third car in households.

Aluminium in the packaging industry

Packaging in Germany



Aluminium (in 1.000 t)

84,5 70,4 69,4 68,8 79,3 80,4 81,9 76,8 *)

=> per-captia about 1 kg aluminium

The packaging industry today and in future

- Aluminium is used for cans, foil is used for beverage cartons, sachets, wrappers, pharmaceutical blisters, ready meals etc.
- Over the last 30 years the thickness of aluminium foil required for packaging applications has fallen by about 30 percent. Making thinner aluminium is more expensive as it requires an additional production step.
- The exports of aluminium foil from Europe rose 11 percent in the first quarter 2005, the internal demand slightly decreased.
- Aluminium foil is used because of its strength and malleability. Moreover it is fully recyclable (thin foils can be recovered thermally).
- Companies switch from steel to aluminium beverage cans (which require new recycling methods).

- Requirements set by the European Commission to reduce packaging waste: By the end of 2008 a minimum of 60 percent of packaging waste must be recovered or incinerated. Between 55 and 80 percent of packaging waste must be recycled. For glass, paper and board the target is 60 percent by weight. For metals the aim is 50 percent, for plastics 22,5 percent and for wood 15 percent.
- According to a study, cans cause 70 percent less process costs for retailers compared to re-usable bottles.
- Recycling gets more important (e.g. nationwide return system in Germany). Without aluminium recycling the EU would have to import about 7,8 million tonnes of aluminium a year to meet the current requirements.

Aluminium in the construction industry

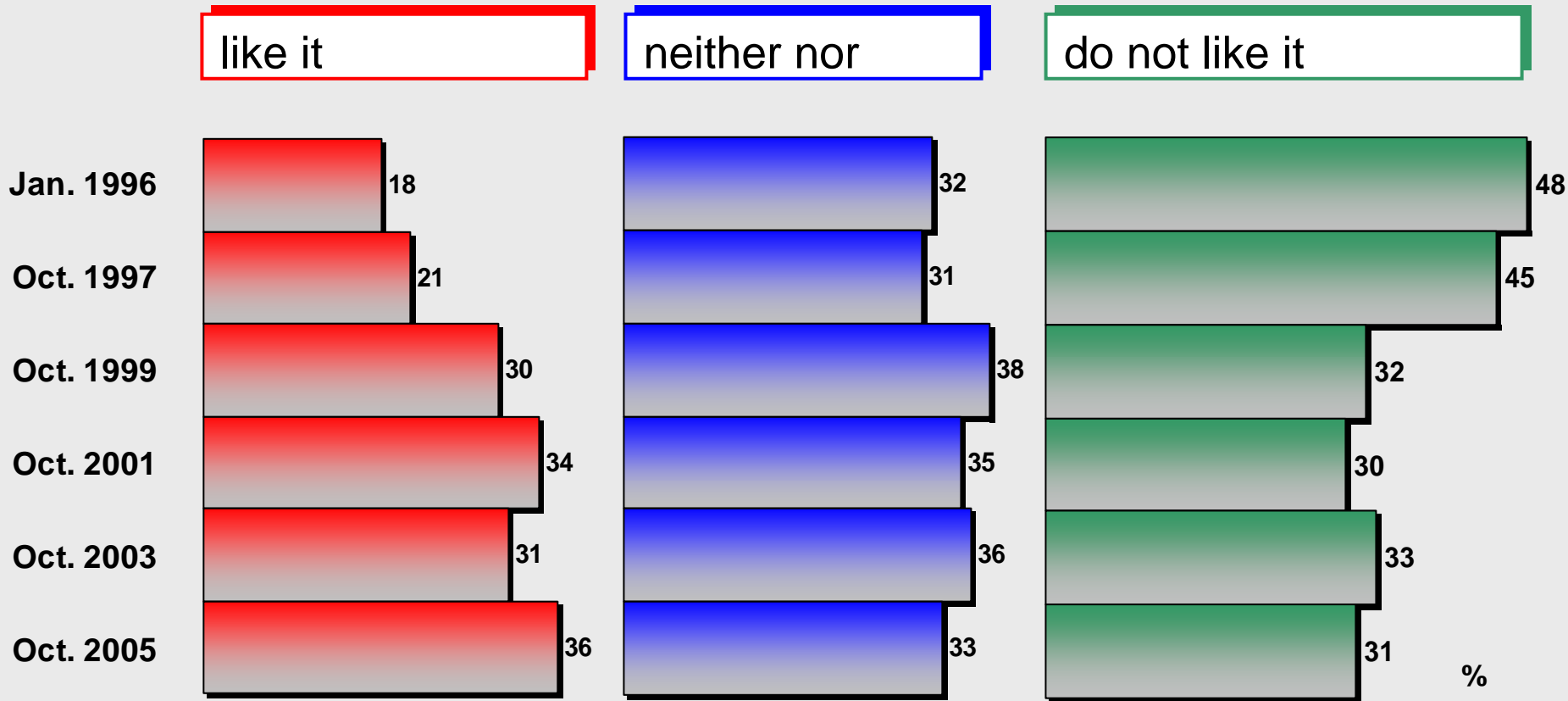
New buildings in Austria

More building activities in the west than in the east

	2001	Increase since 1991	
Vorarlberg	89.236	13.405	17,7%
Salzburg	119.818	17.127	16,7%
Tyrol	161.261	22.724	16,4%
Upper Austria	352.326	44.476	14,4%
Styria	325.822	37.020	12,8%
Carinthia	162.075	18.146	12,6%
Lower Austria	553.604	59.406	12,0%
Burgenland	114.403	10.874	10,5%
Vienna	168.167	14.474	9,4%
Austria	2.046.712	237.652	13,1%

=> 2.000 new buildings per month!

The Austrians like aluminium windows

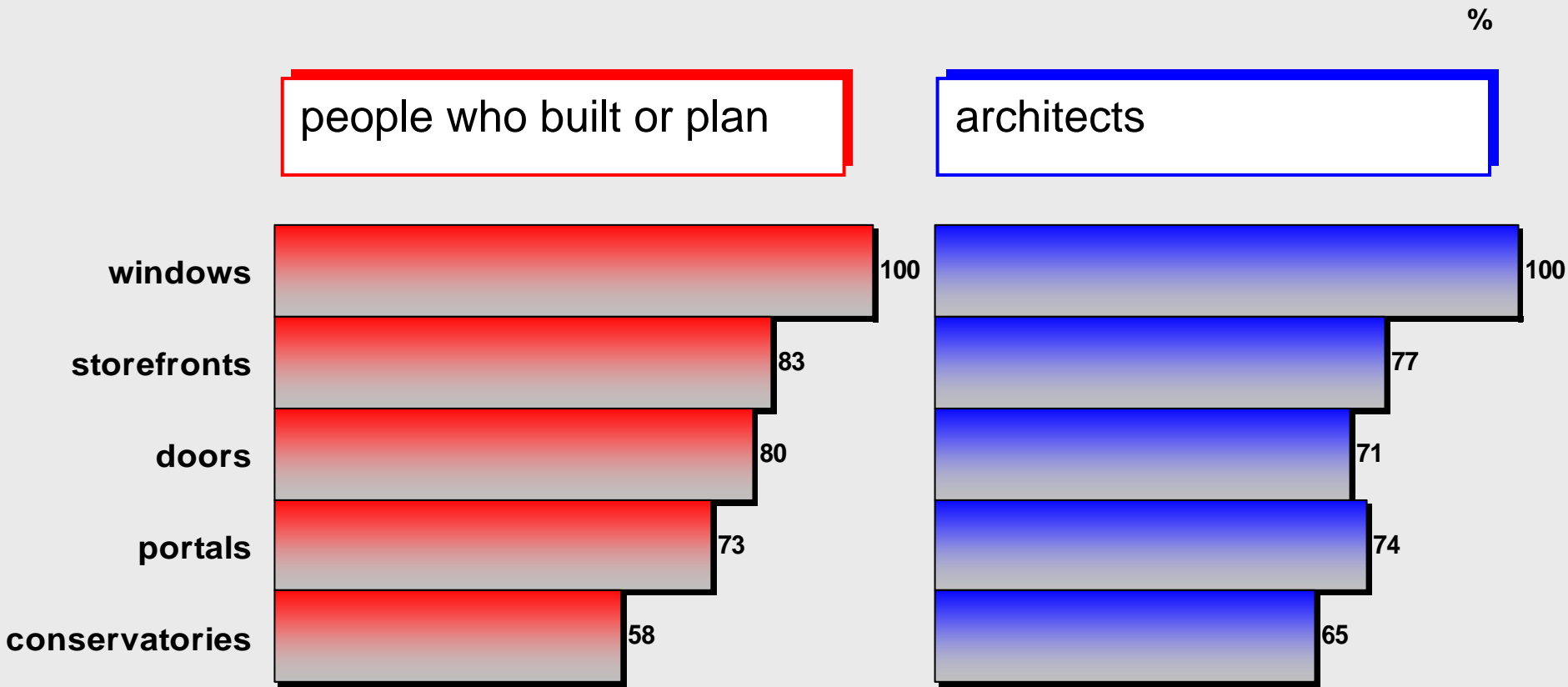


Especially men, people aged 30 to 49 years and better educated people like aluminium.

The reputation of aluminium among Austrians

	general population	people who built or intend to build a house
▪ Long durability	+++	+++
▪ Light, low weight	+++	++
▪ Needs low maintenance	++	+
▪ Stable	++	+++
▪ Easy to manufacture	++	++
▪ Weatherproof	++	+
▪ Large variety to use	+	++
▪ Rustless, non-corrosive	+	+
▪ Modern, looks nice	+	+
▪ Especially for public buildings	+	+
▪ Looks cold, too cool	--	-

The variety of aluminium for buildings



=> Not only architects know about the large variety of aluminium usage.

Trends in the construction industry

- People like aluminium more and more.
The former image of being cold and passive has changed to being creative, individual, secure and modern.
- The brand ALU-FENSTER® and its areas of applications are better known than in the past.
- In the end, the people who build – not the architects – decide which material is used.
- Large glass windows are getting more popular – aluminium in combination with wood is perfect for that.
- Glass storefronts (not only for public buildings) are considered to be modern and progressive.

Trends in the construction industry (cont.)

- It gets more and more important that the metal construction business works close together with other construction businesses.
- Transparent storefronts demonstrate “I am open-minded and modern” – especially important for public buildings.
- Aluminium is considered to be durable, long lasting, stable, weather proof, needs low maintenance and is therefore cost efficiently.
- There is a potential for the use of aluminium to redevelop old buildings. The combination of old and new styles (e.g. glass storefronts) are very popular.
- Metal has a large architectural potential and is predestined for unusual, modern constructions.

General trends

- Generation 50+ (“Best Ager”), more wealthy and healthy, less children, more singles
- More traffic, especially in cities (telematic)
- New markets, especially China, other Asian countries, Russia, Middle East
- Globalisation, costs for manpower and transport
- Less resources, increasing energy costs and energy consumption, leads to new raw materials and alternative energy
- IT, internet, mobile phones
- New materials and composites (e.g. aluminium combined with steel, Lithium), nano technology
- Bionik (e.g. surface of airplanes)

Frank O. Gehry, Guggenheim Museum in Bilbao

