ELECTROWATT-EKONO
Jaakko Pöyry Group

ILEX ENERGY CONSULTING

The Impact of the EU Emissions Trading Scheme on European electricity prices

A presentation to the Milan Climate Change Conference

John Macadam and Marco Cittadini

30 November 2004

Agenda

1. Introduction
2. Forward prices for power and carbon
3. Projections of wholesale electricity prices
4. Pass-through of carbon into electricity prices
5. Impact of carbon on retail prices
6. Electricity prices and carbon emissions in Italy
7. Conclusions

Agenda

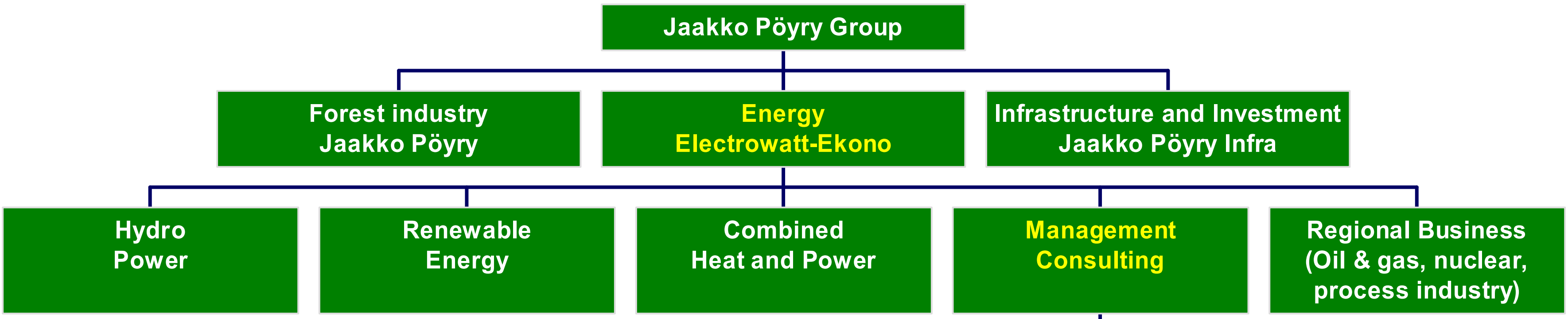
1. Introduction
2. Forward prices for power and carbon
3. Projections of wholesale electricity prices
4. Pass-through of carbon into electricity prices
5. Impact of carbon on retail prices
6. Electricity prices and carbon emissions in Italy
7. Conclusions

ILEX is an independent consultancy in competitive energy markets

- A leading independent European energy markets consultancy specialising in:
  - electricity
  - gas
  - carbon
  - renewables

- ILEX provides a wide range of strategic, commercial, economic and regulatory advice in the UK and continental Europe

ILEX is part of Electrowatt-Ekono



- Electrowatt-Ekono has offices in 20 countries and employs 1100 experts worldwide
- Electrowatt-Ekono incorporating ILEX is now the leading energy management consulting company in Europe, employing nearly 100 specialised consultants

ILEX and Electrowatt-Ekono have worked in Italy for several years

- Scenario projections of electricity, gas and green certificate (CV) prices, from fundamental modelling
- Reports on the electricity, gas and CV markets
- Advice on project finance for IPP developments (CCGTs and renewables) and for power plant acquisitions (e.g. the Enel gencos)
- Assessment of differing options for electricity market design, including capacity payments
- Strategic advice to players in the energy markets
- Structuring of business organisations and processes

Objectives of presentation

- To report on a study undertaken for the British government, which covered:
  - the UK, Italy, Germany, France, the Netherlands, Spain, Ireland and the EU countries using Nord Pool
  - examining evidence for a relationship between carbon prices and electricity prices, both historic and into the future
  - projecting the impact of carbon price on wholesale and retail prices (primarily industrial)

- To comment in particular on the projected impact of the EU Emissions Trading Scheme (ETS) on electricity prices and carbon emissions in Italy

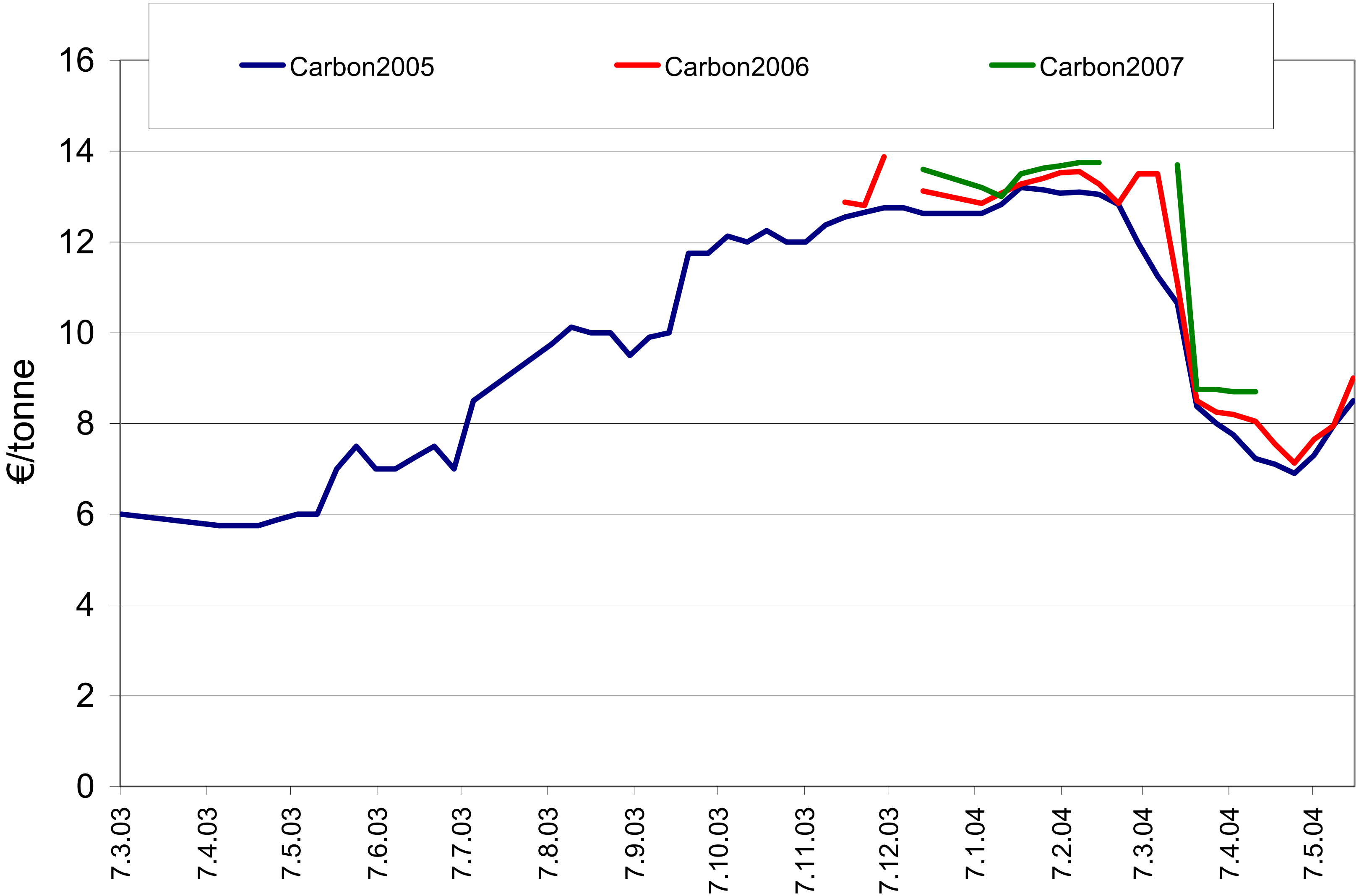
Agenda

1. Introduction
2. Forward prices for power and carbon
3. Projections of wholesale electricity prices
4. Pass-through of carbon into electricity prices
5. Impact of carbon on retail prices
6. Electricity prices and carbon emissions in Italy
7. Conclusions

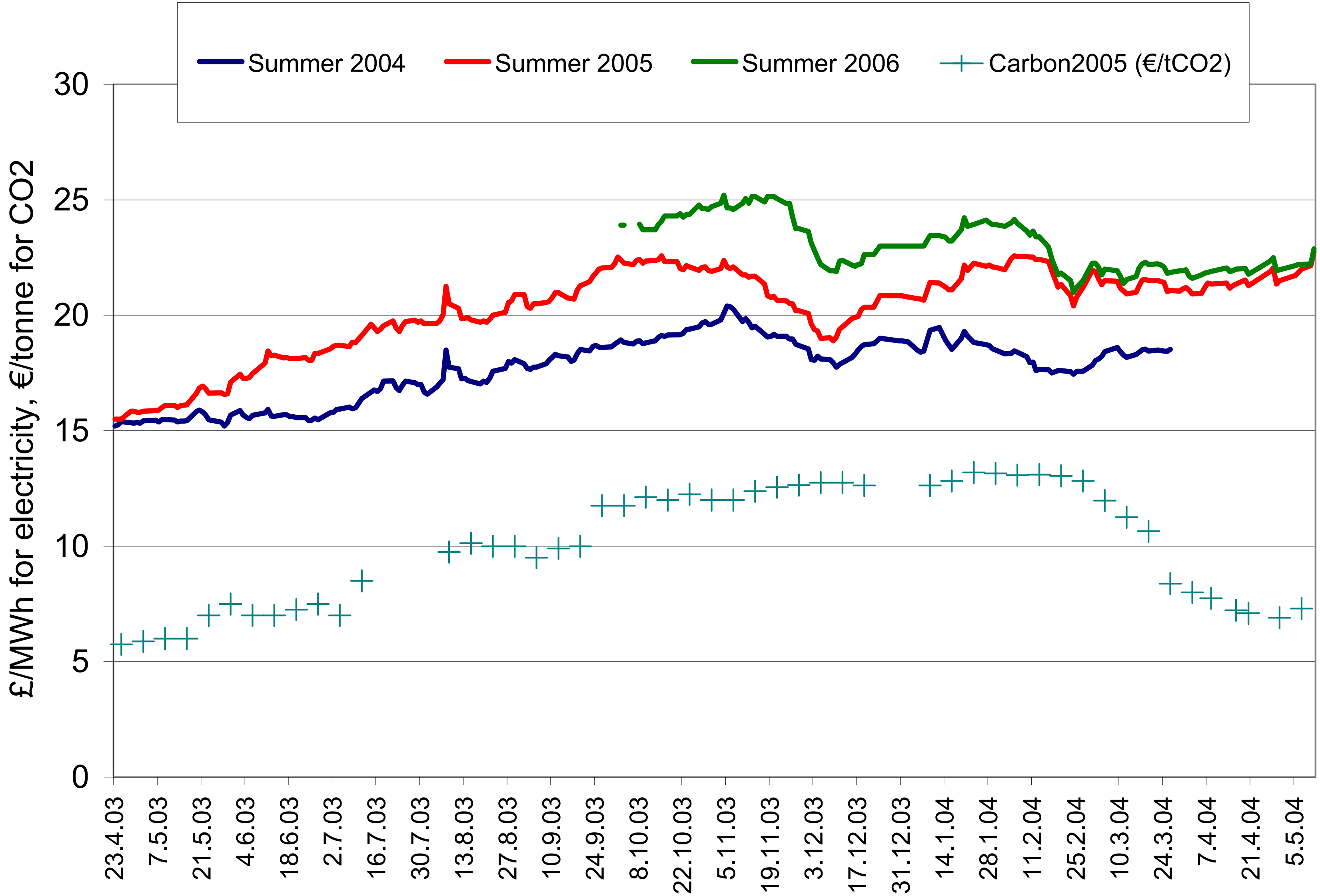
Is carbon already factored into forward electricity prices?

- We used two approaches:
  - Analysis of historical movements in carbon and power forwards
  - Projections of future power prices and comparison with power forwards

Carbon prices have moved
Price today is €8.7/MWh

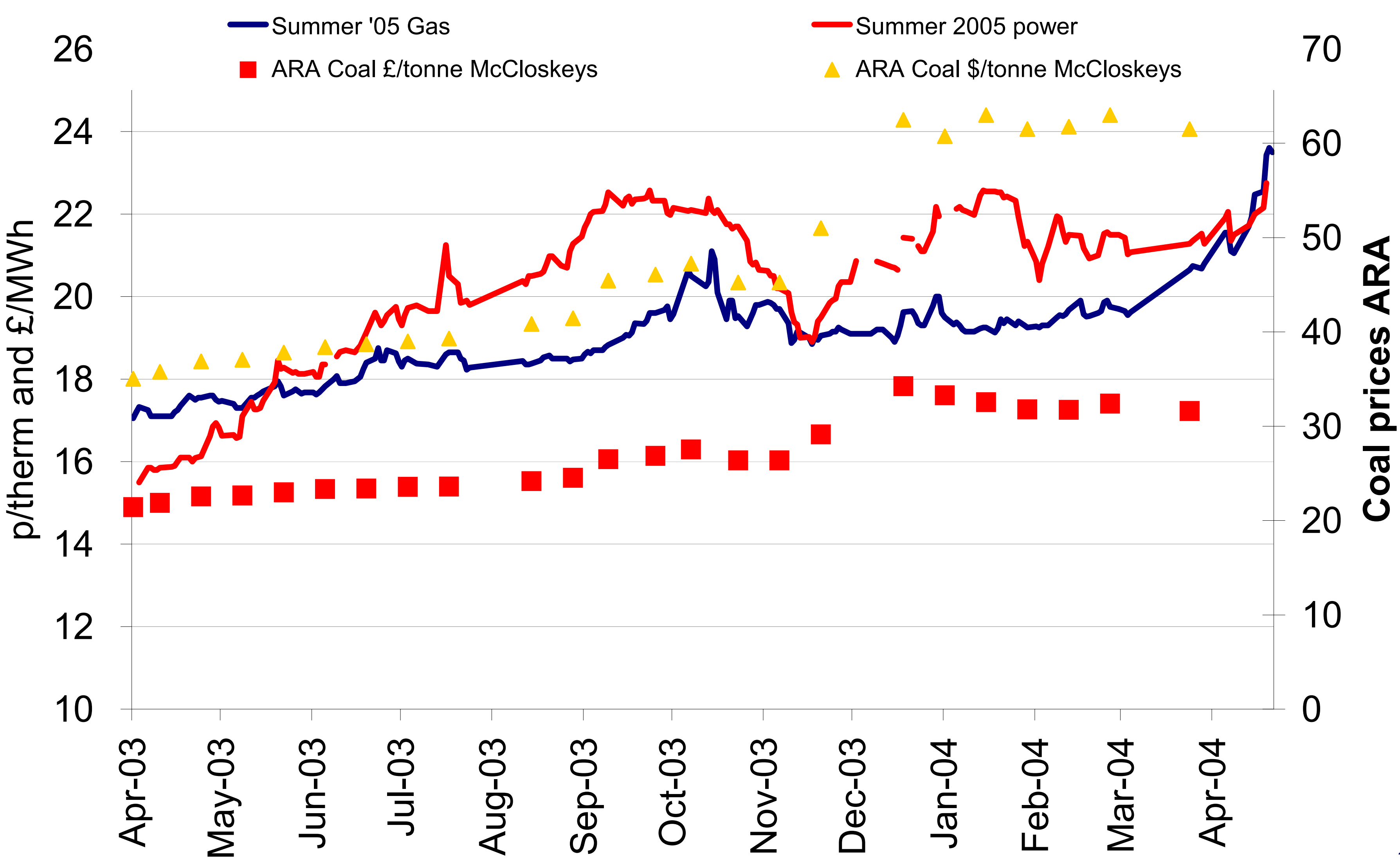


There is some evidence of correlation:
Trading of summer contract for England and Wales (E&W) and carbon 2005



But there are many other factors which influence power prices:

Gas, coal and power forwards 2005 summer



Conclusions – is carbon factored into power prices?

- Inconclusive results
- Carbon trading is very illiquid and power trading is illiquid in many countries
- It would appear that forward power prices were correlated to forward carbon prices during 2003 but it is unclear that there was any causal relationship
- The correlation disappeared when carbon prices fell in 2004
- Is it in incumbents' interest to have an obvious link?

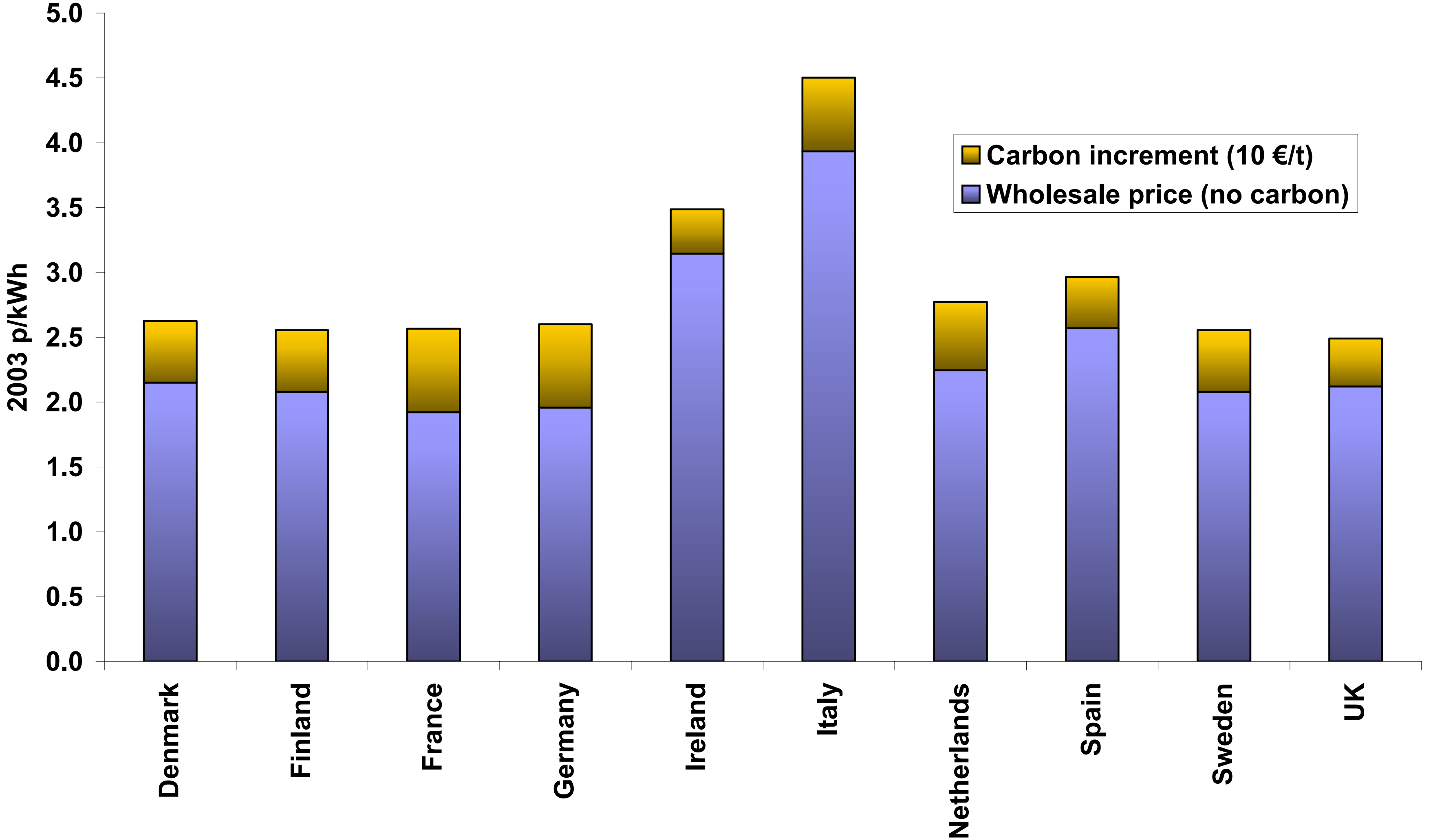
Agenda

1. Introduction
2. Forward prices for power and carbon
3. Projections of wholesale electricity prices
4. Pass-through of carbon into electricity prices
5. Impact of carbon on retail prices
6. Electricity prices and carbon emissions in Italy
7. Conclusions

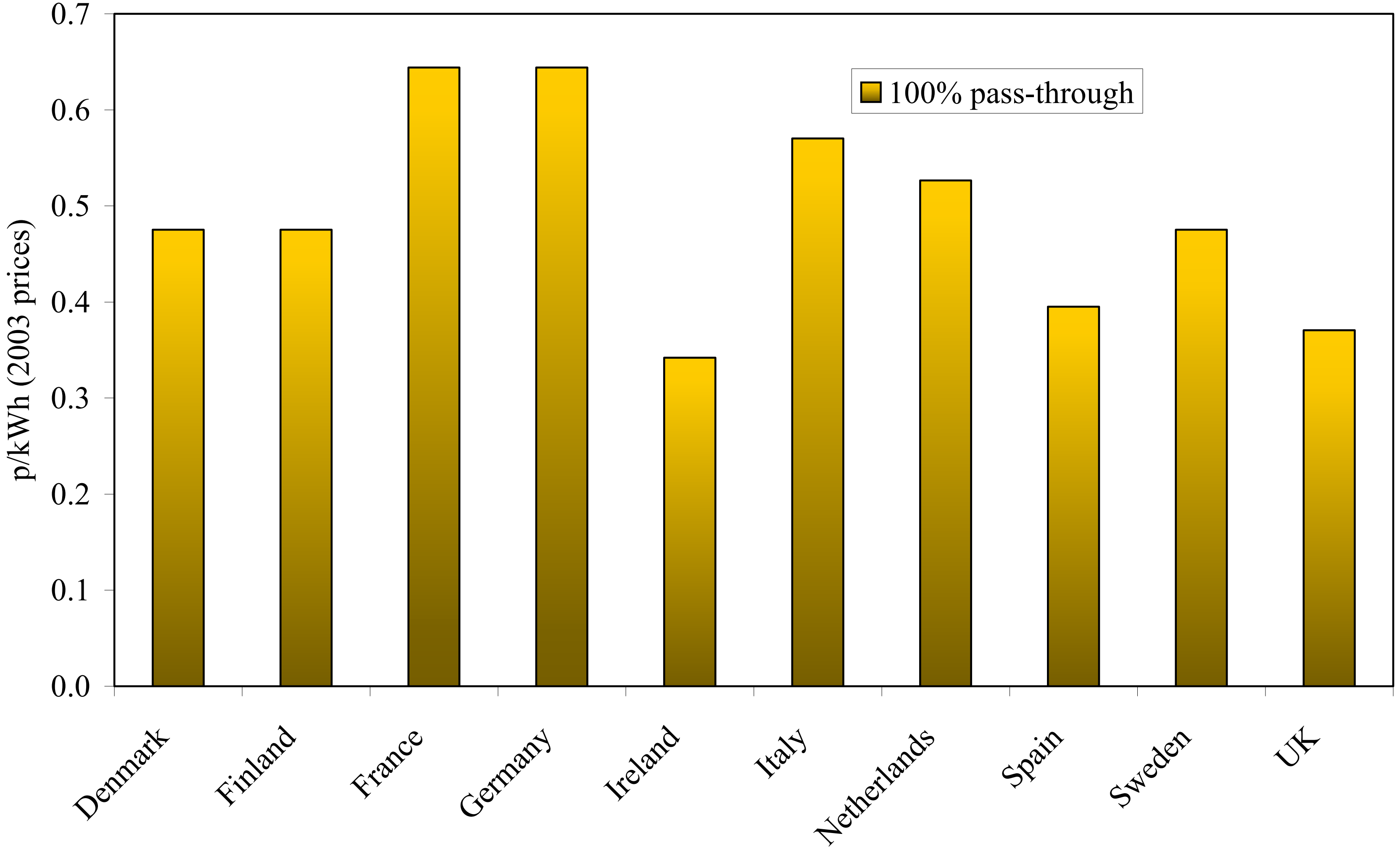
Key factors for the impact of carbon on electricity prices

- The price of CO_2 that emerges from the EU ETS
- The level of pass-through of the value of carbon into wholesale and retail prices

Projected wholesale prices with full carbon impact



Impact of carbon on electricity prices in Europe in 2005 (carbon at €10/tonne)



Agenda

1. Introduction
2. Forward prices for power and carbon
3. Projections of wholesale electricity prices
4. **Pass-through of carbon into electricity prices**
5. Impact of carbon on retail prices
6. Electricity prices and carbon emissions in Italy
7. Conclusions

Key factors for pass-through

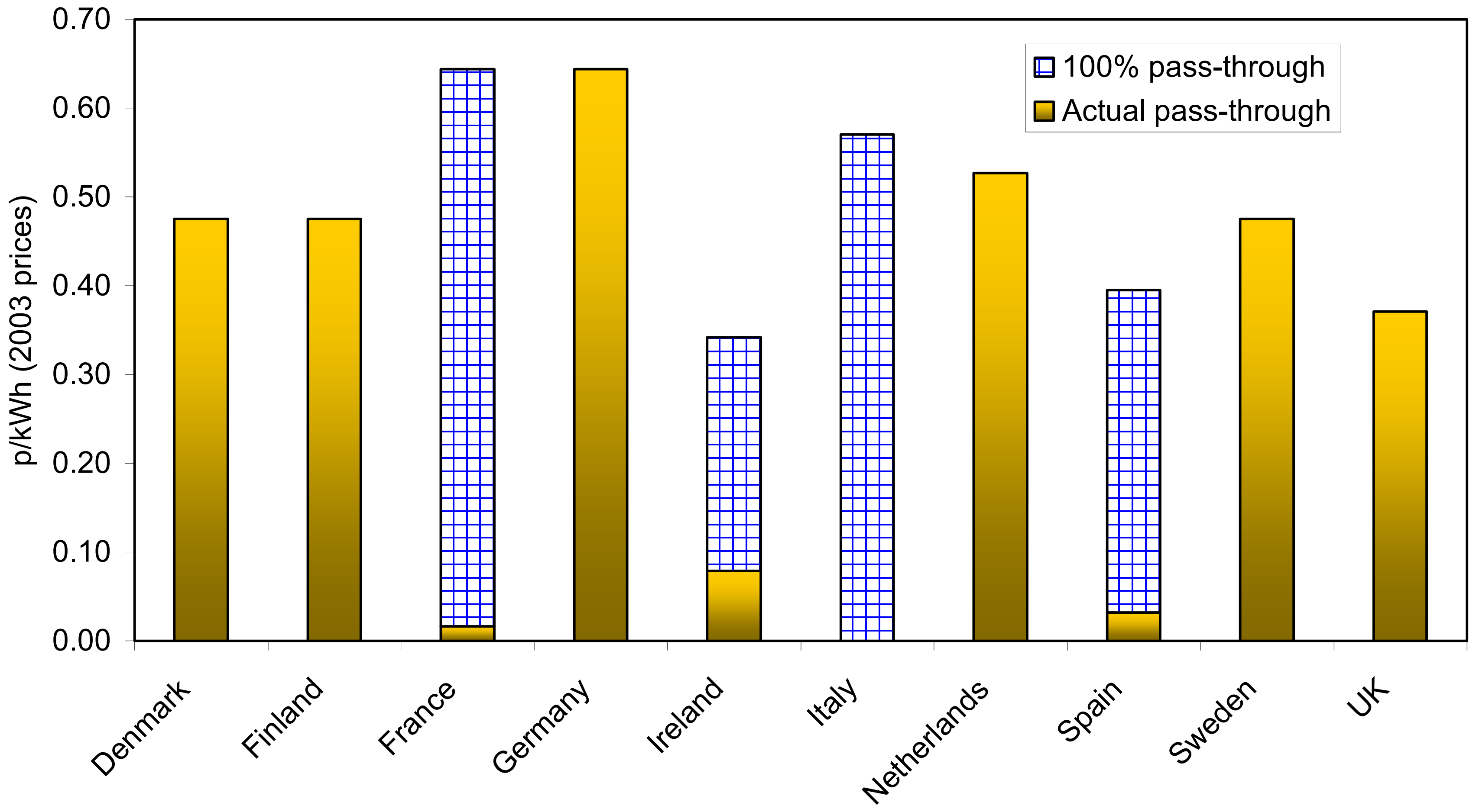
- Generation market structure
- Regulatory and/or political intervention:
  - who gets the ‘windfall’ from the allocation of free allowances?
- Stringency of National Allocation Plans (NAPs)
- Treatment of new entry and closure
- Rebasing for Phase 2

Summary of determinants affecting pass-through

Country/ Region	Pass-through (wholesale)	Pass-through (retail)	Determinants	Confidence level
NordPool	100%	100%	NAP-T	3
Germany	100%	100%	RP, MS, NAP-L	1
Netherlands	100%	100%	MS, NAP-T	2
France	100%	2.5%	RP	2
Spain	8%	8%	RP	3
Italy	0%	0%	RP, NAP-L	2
Ireland	23% (2005), 100%	23%	RP	3
UK	100%	100%	MS	2

Key: RP=regulatory/political, MS=market structure, NAP-T/L=tight/loose NAP
Confidence 1= low confidence, 3 = high confidence

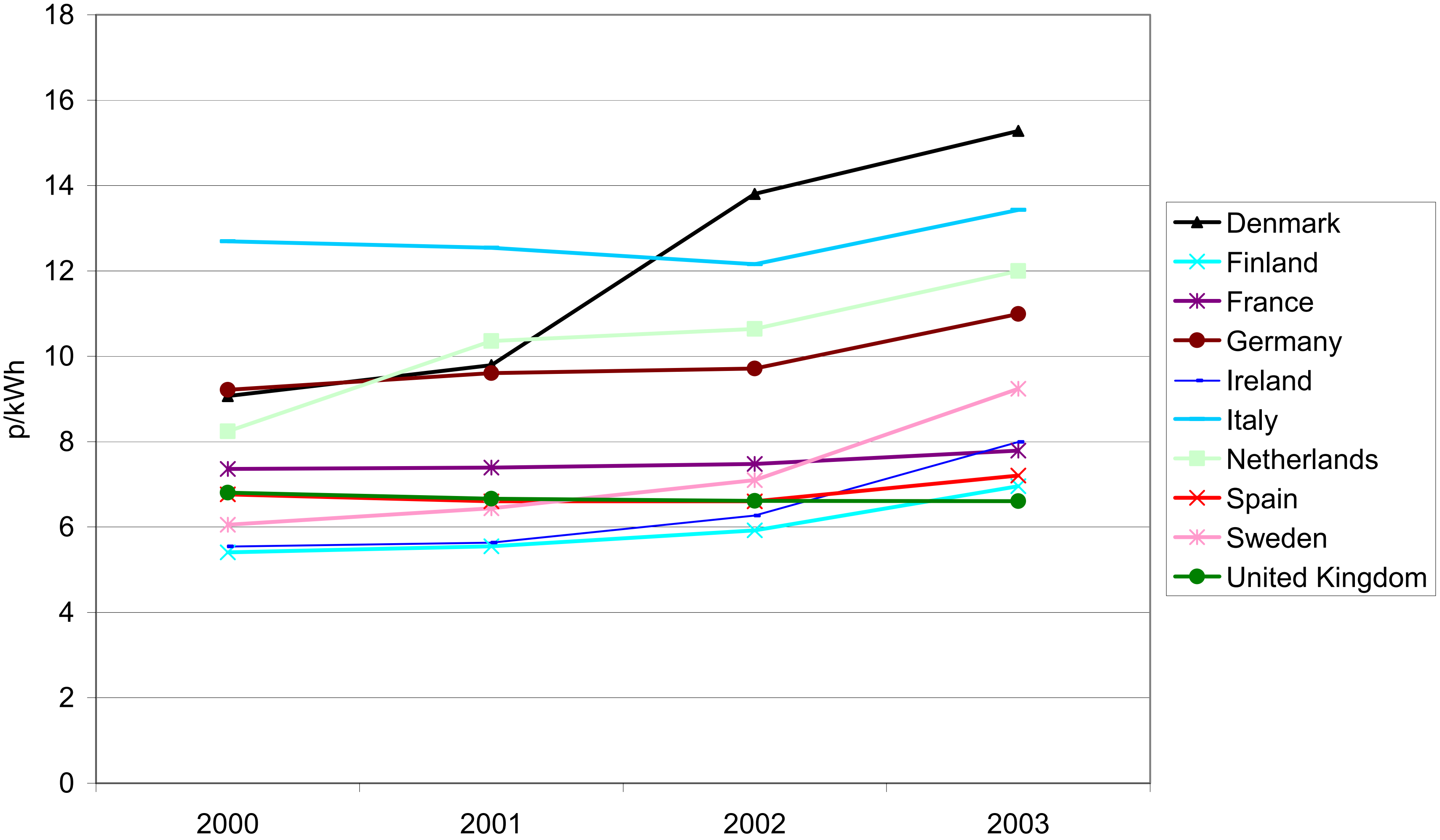
Retail pass-through levels



Agenda

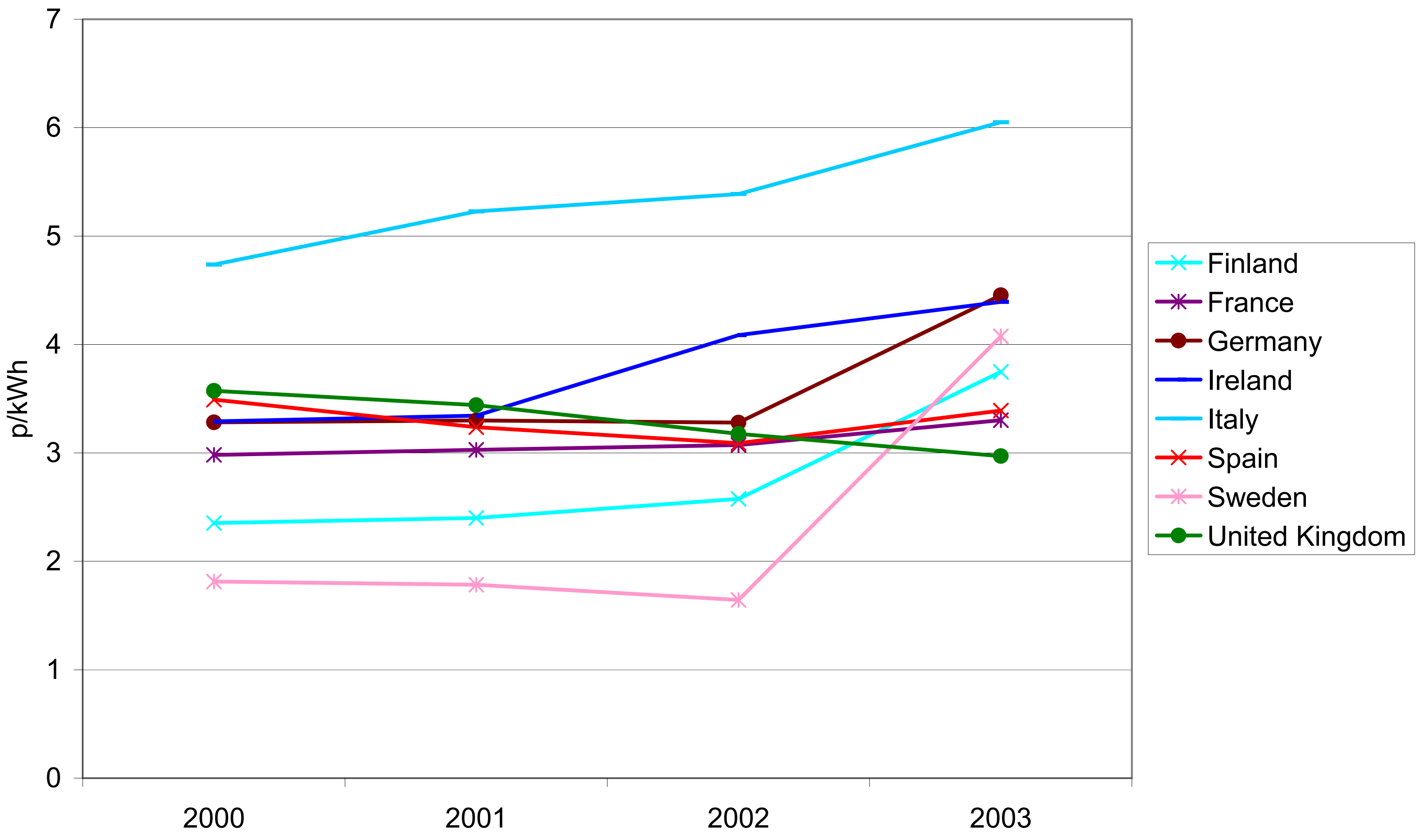
1. Introduction
2. Forward prices for power and carbon
3. Projections of wholesale electricity prices
4. Pass-through of carbon into electricity prices
5. Impact of carbon on retail prices
6. Electricity prices and carbon emissions in Italy
7. Conclusions

Historical final prices to medium domestic customers including taxes



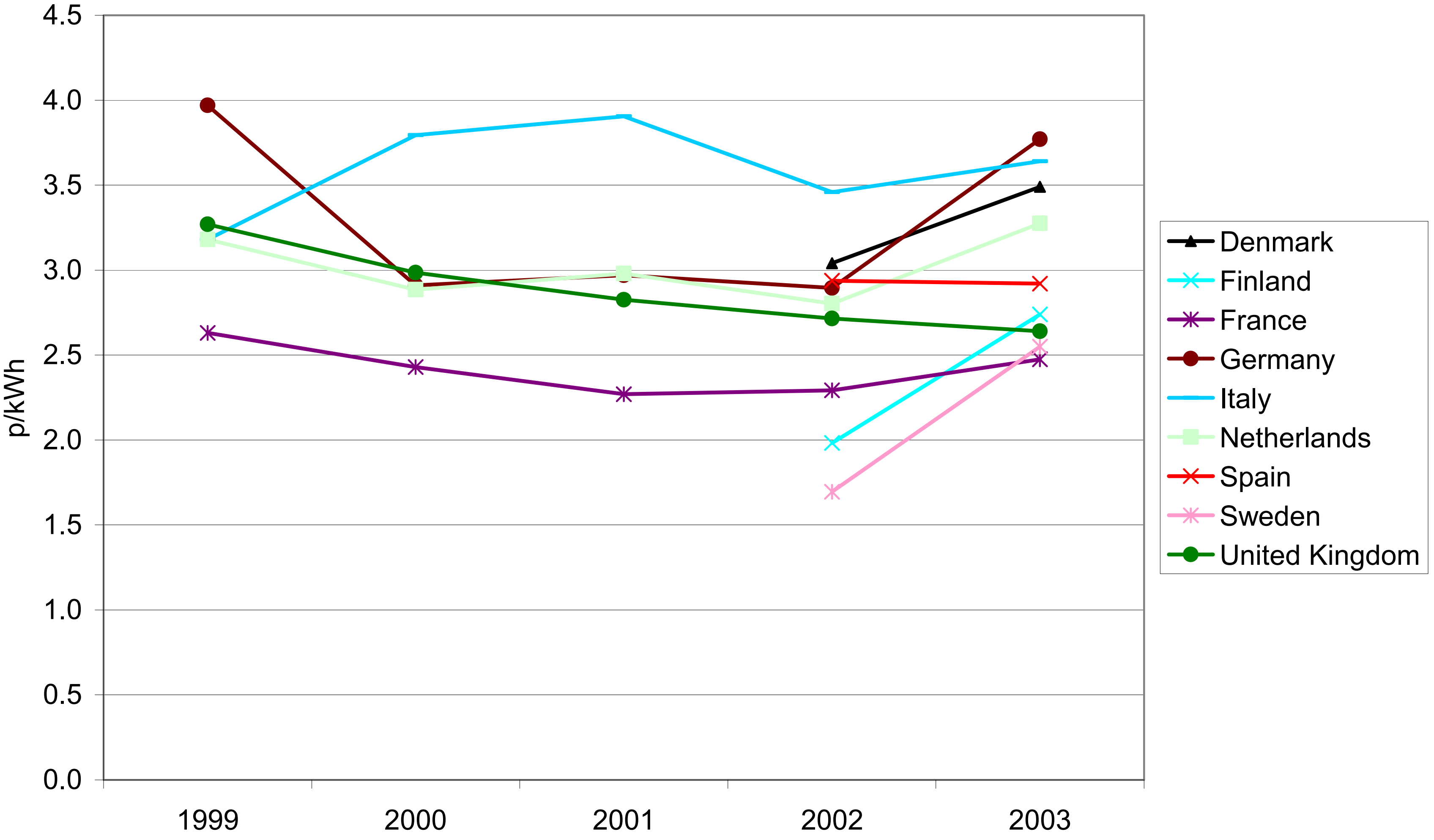
Consuming 3,500kWh per annum, of which 1,300kWh at night.

Historical final prices to medium industrial customers including taxes



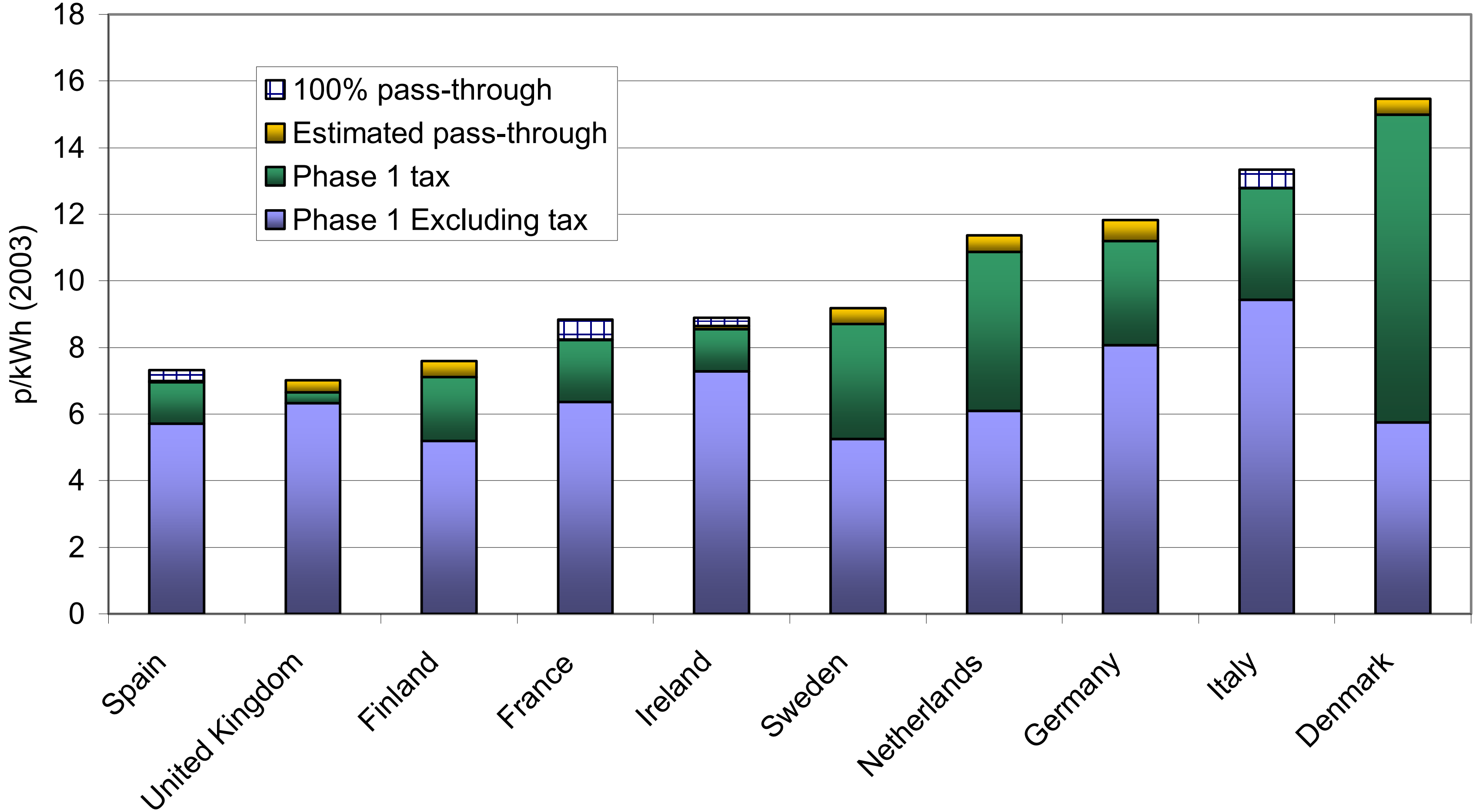
Consuming 24GWh per annum with a maximum demand of 4MW.

Historical final prices to extra large industrial customers including taxes

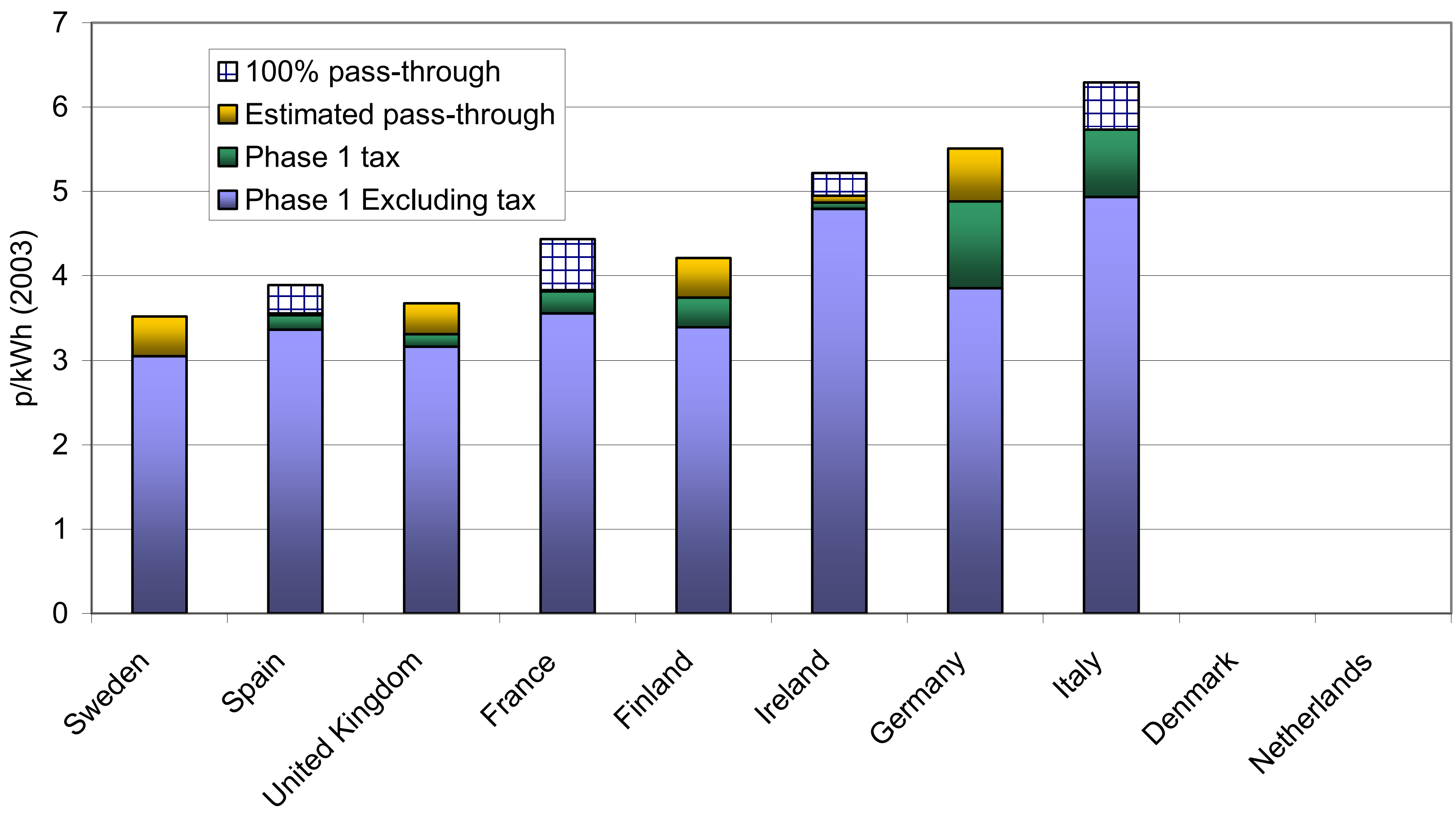


Consuming 420GWh per annum with a maximum demand of 50MW.

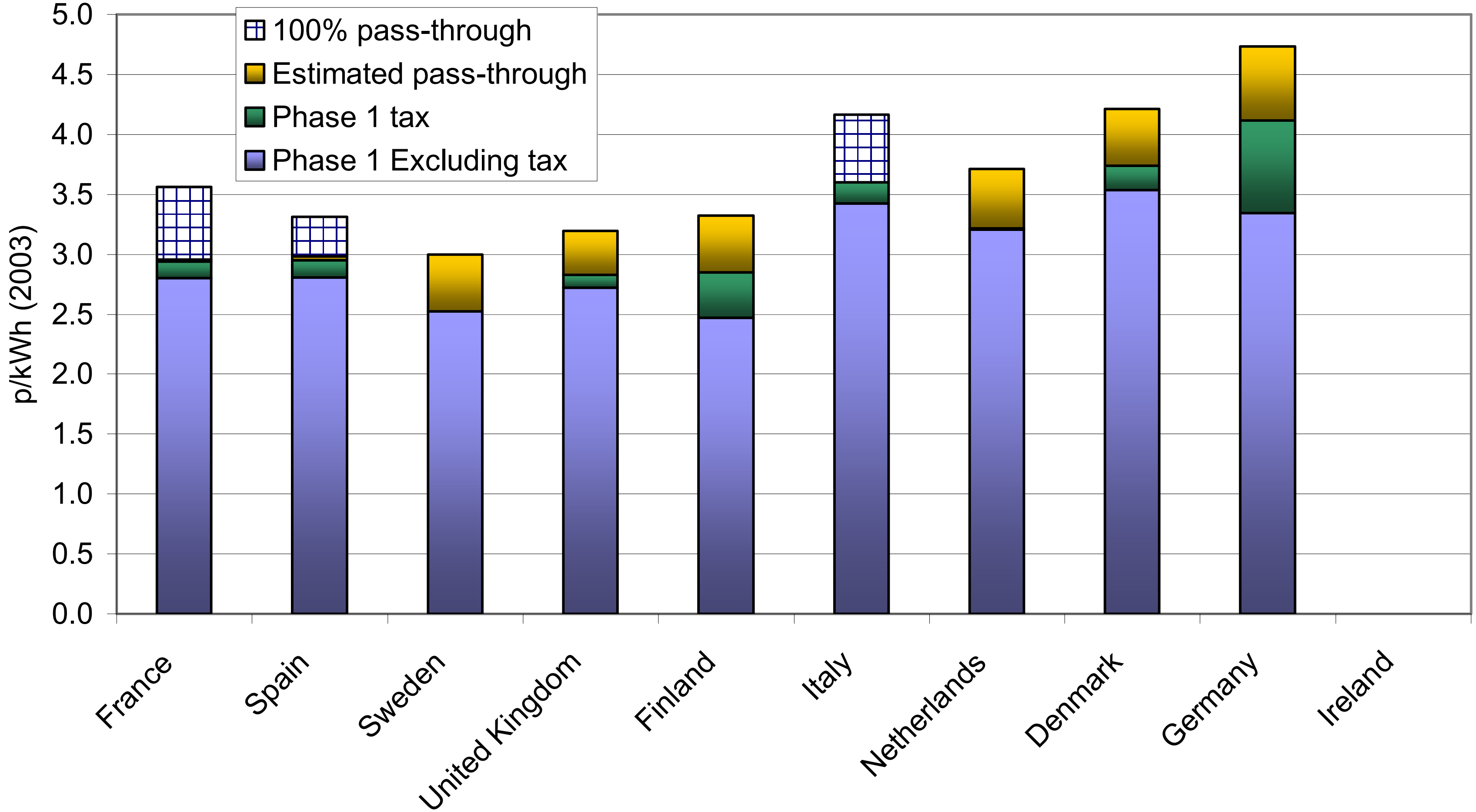
Projections for medium domestic retail prices in Phase 1



Projections for medium sized industrial prices in Phase 1



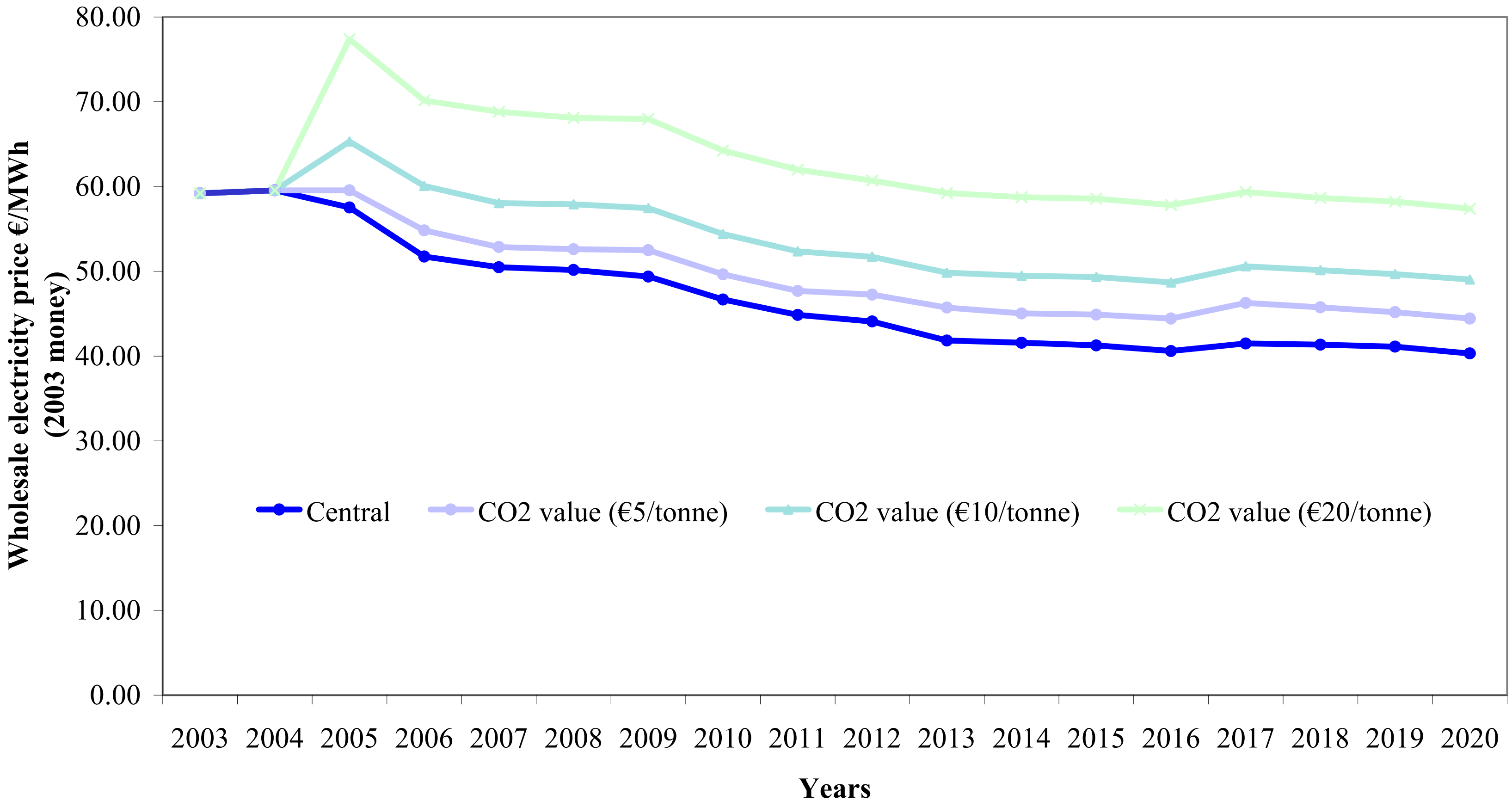
Projections for extra large industrial prices in Phase 1



Agenda

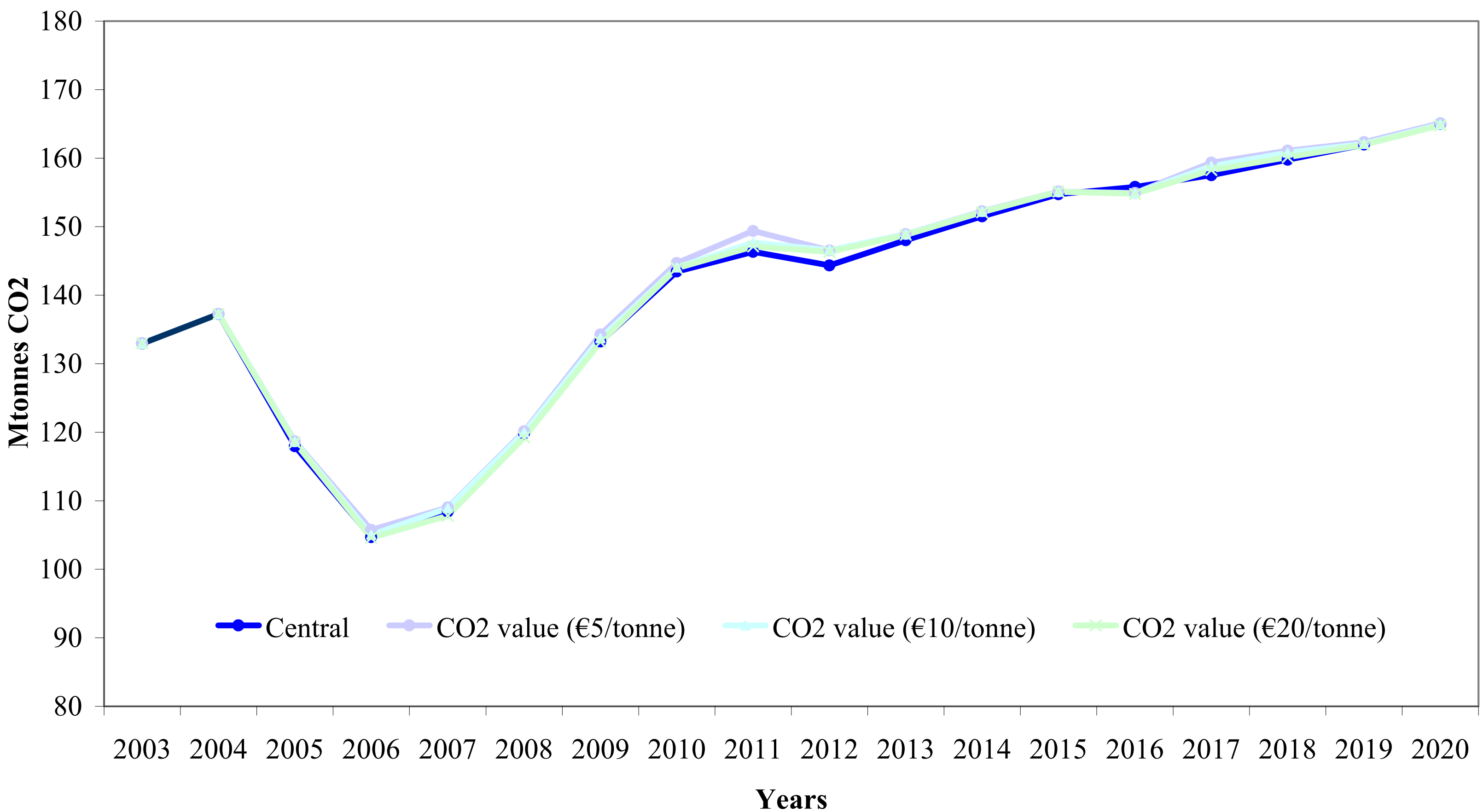
1. Introduction
2. Forward prices for power and carbon
3. Projections of wholesale electricity prices
4. Pass-through of carbon into electricity prices
5. Impact of carbon on retail prices
6. Electricity prices and carbon emissions in Italy
7. Conclusions

With full pass-through, carbon could have a major impact on power prices in Italy -
because of oil



But power sector carbon emissions are insensitive to carbon price -

because of the fuel mix



Electricity prices and carbon emissions in Italy

- The projected growth in CCGTs will likely lead to a significant reduction in carbon emissions for the duration of Phase 1
- The Italian NAP proposes free allowances to the power sector which would total about 137 million tonnes for each of the three years of Phase 1
- Therefore, zero pass-through is a real possibility in Phase 1
- Later, emissions will likely rise as electricity demand continues to grow, as some capacity is repowered to coal and as imports from France decline
- This could lead to severe problems for the Italian power sector in Phase 2 of the EU ETS

Agenda

1. Introduction
2. Forward prices for power and carbon
3. Projections of wholesale electricity prices
4. Pass-through of carbon into electricity prices
5. Impact of carbon on retail prices
6. Electricity prices and carbon emissions in Italy
7. Conclusions

Conclusions

- If there were to be full pass-through of the carbon price into wholesale power prices in Italy, then (because of the fuel mix) those prices would rise significantly
- However, power prices in Italy are already high compared with other European countries
- The Italian NAP looks sufficiently lax that zero pass-through is a real possibility for Phase 1
- Power sector carbon emissions in Italy are in any case insensitive to changes in carbon price (within a plausible range)

Closing remarks

- But Phase 2 looks very problematic for the Italian power sector
- The position might be eased somewhat if growth in electricity demand were to be constrained by higher prices in Phase 1, through non-zero pass-through
- The resulting windfall gains to generators could be used to accelerate the build of low-carbon generating capacity
- There are of course other reasons for high prices in Italy, which could be addressed independently

ELECTROWATT-EKONO
Jaakko Pöyry Group

ILEX ENERGY
CONSULTING

Contact: john.macadam@ilexenergy.com

marco.cittadini@ewe.ch

ILEX Energy Consulting Ltd

King Charles House, Park End Street, Oxford, OX1 1JD

Tel: +44 (0)1865 722660

www.ilexenergy.com

www.ewe.ch