Liberalisation & Regulation Effects on RE Development

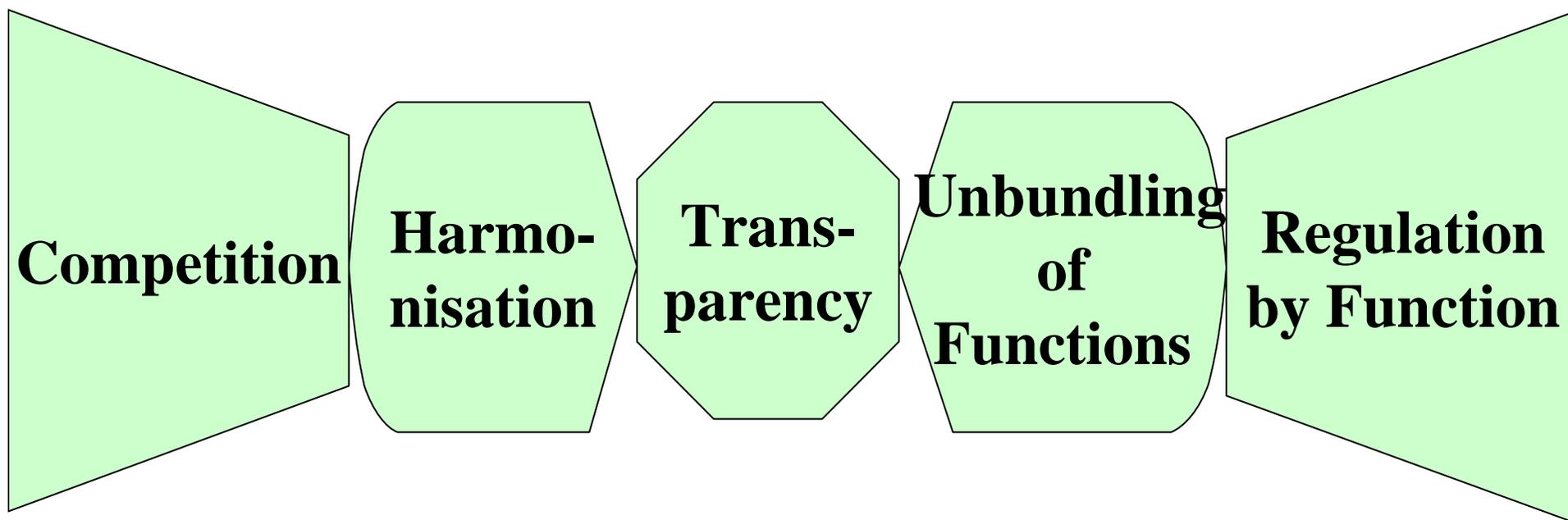Prof.Aviel Verbruggen

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Contents

1. Liberalisation(s) revisited
2. Effects (+/-) for RE development
3. Backstop supply solution(s)
4. Is the renewable backstop affordable?
5. Backstop End-Use Efficiency
6. How to become hatred?

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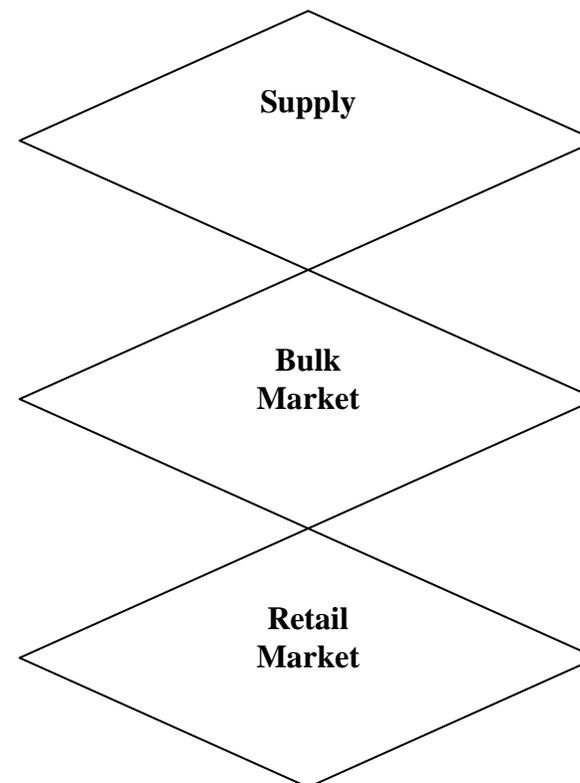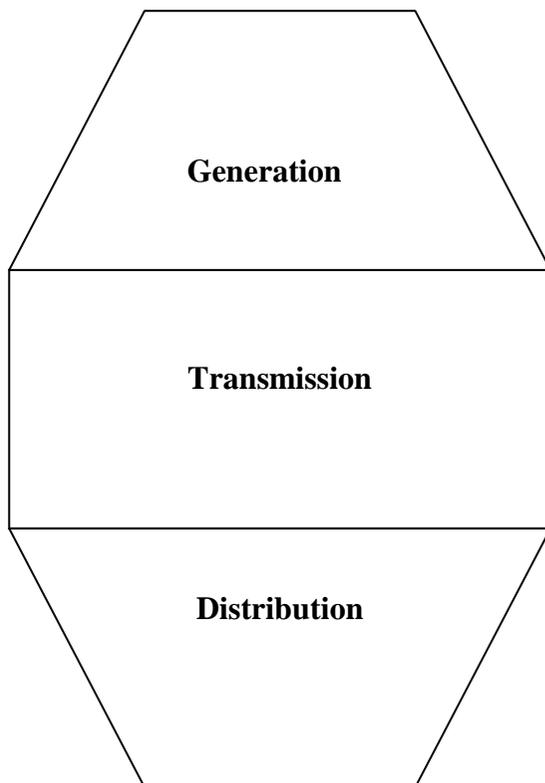
Competition and Regulation Balanced

Competition | Harmo-nisation | Trans-parency | Unbundling of Functions | Regulation by Function
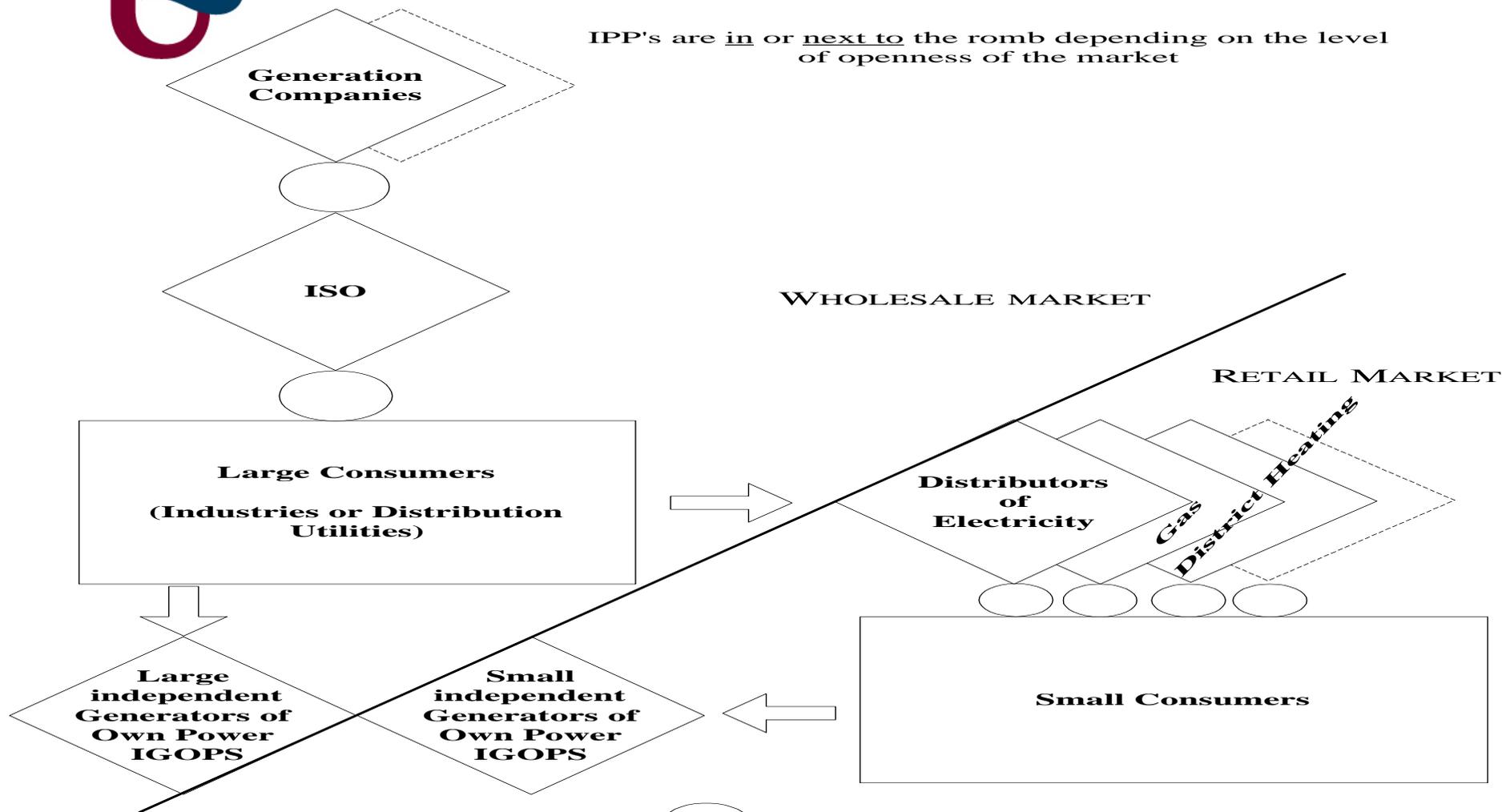
Unbundling GEN-TRANS-DIS

Normative Structure

IPP's are <u>in</u> or <u>next to</u> the romb depending on the level of openness of the market

Generation Companies

ISO

WHOLESALE MARKET

RETAIL MARKET

Large Consumers

(Industries or Distribution Utilities)

Distributors of Electricity

Gas

District Heating

Large independent Generators of Own Power IGOPS

Small independent Generators of Own Power IGOPS

Small Consumers

⬭ = **energy transfer and tariff nodes**

◇ = **independent actors in the power system**

▭ = **consumers**

ISO = **independent system operator**

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+ effects of liberalisation

- ☑ **More public awareness about electricity supply affairs**
- ☑ **(Modest) Development of independent regulatory capability**
- ☑ **Check on Expansion thrift in large-scale coal and nuclear plants**
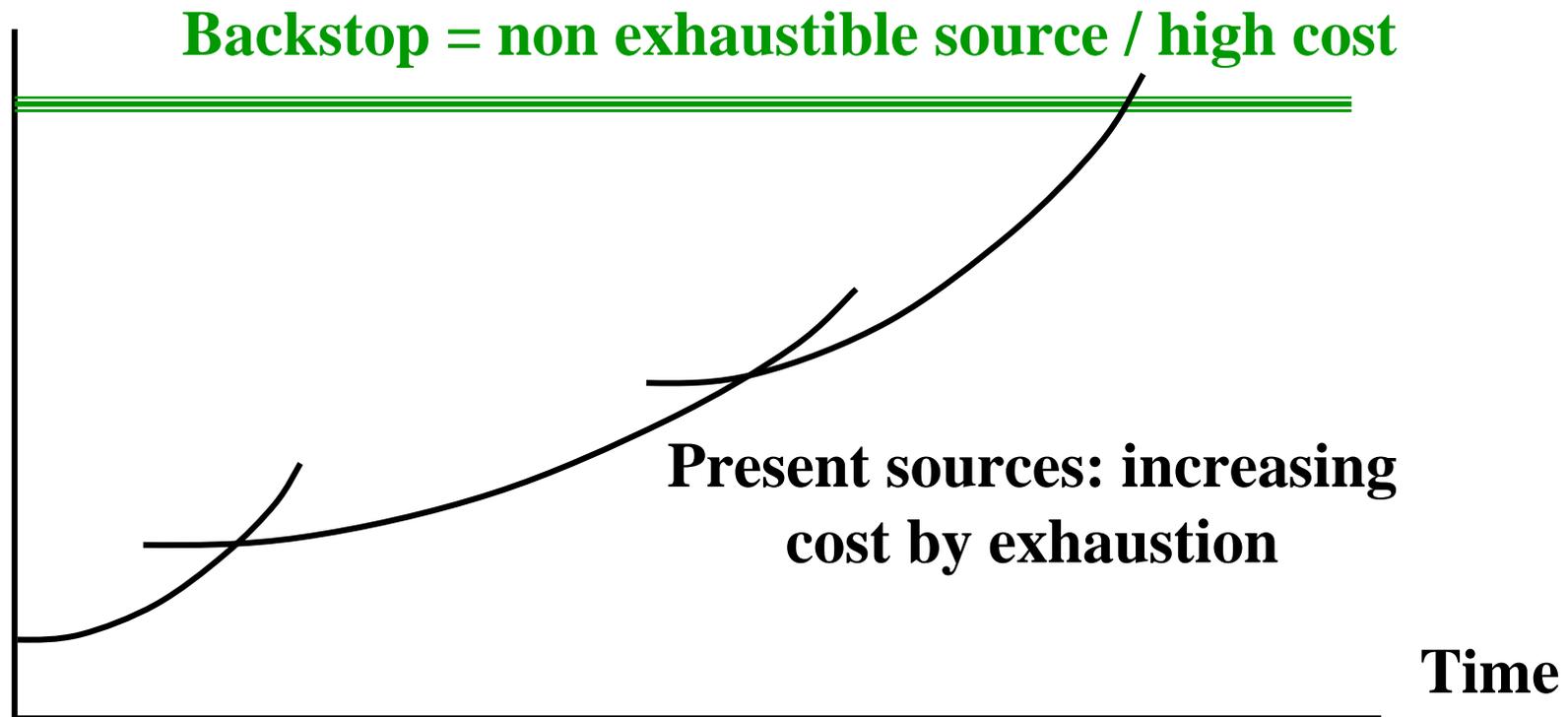- ☑ **Adoption of a specific renewable energy directive**

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- effects of liberalisation

☑ **Disintegration of many local public utility companies**
- **unbundling network and supply functions**
- **destroying economies of scope**
- **high transaction costs (small consumers)**
- **reducing competition in bulk markets**
- **local IRP/DSM opportunities lost**

☑ **Golden Calf of low electricity prices**

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1973: Exhaustion Agenda
Search for "Backstop" Supply

$/kWh

Backstop = non exhaustible source / high cost

Present sources: increasing cost by exhaustion

Time

Backstop Supply Technology 1987

1987: *Our Common Future*

"Sustainable Development"

adds three extra dimensions: democratic – social – ecological to economic.

Therefore the supply backstop must be:

- **Accessible to all (nations and people)**
- **Low-risk, affordable**
- **Environmentally benign**
- **Unlimited in supplying energy**

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Characteristics of Options

PROPERTIES	OPTIONS		
	Nuclear	Fossil fuels	Renewable sources
Energy density	Very dense (E = mc²)	Dense	Mostly diffuse except some Hydro and Biomass H&B
Scale	Centralised, gigantic	Divisible, all scales	Distributed except H&B
Control (modulation)	Inflexible, always full load	At command	Intermittent, partly unpredictable except H&B
Cost price	Expensive	Cheap	Very expensive
Acute risks	High: nuclear accidents; radioactive releases; proliferation of weapons	Manageable although severe accidents can happen (mines, tankers; pipelines)	Tiny (major risks from large scale hydro)
Chronic pressures	Nuclear waste; Minor emissions; landscape (more HV lines)	CO2 emissions; air pollution; leakages ; solid waste (coal ashes)	Landscape and land-use impacts
Sustainability	Critical (will fusion deliver?)	Climate Change; Exhaustion of premium sources	Global and eternal

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Renewables Affordable?

? Is an almost complete renewable supply affordable as backstop?

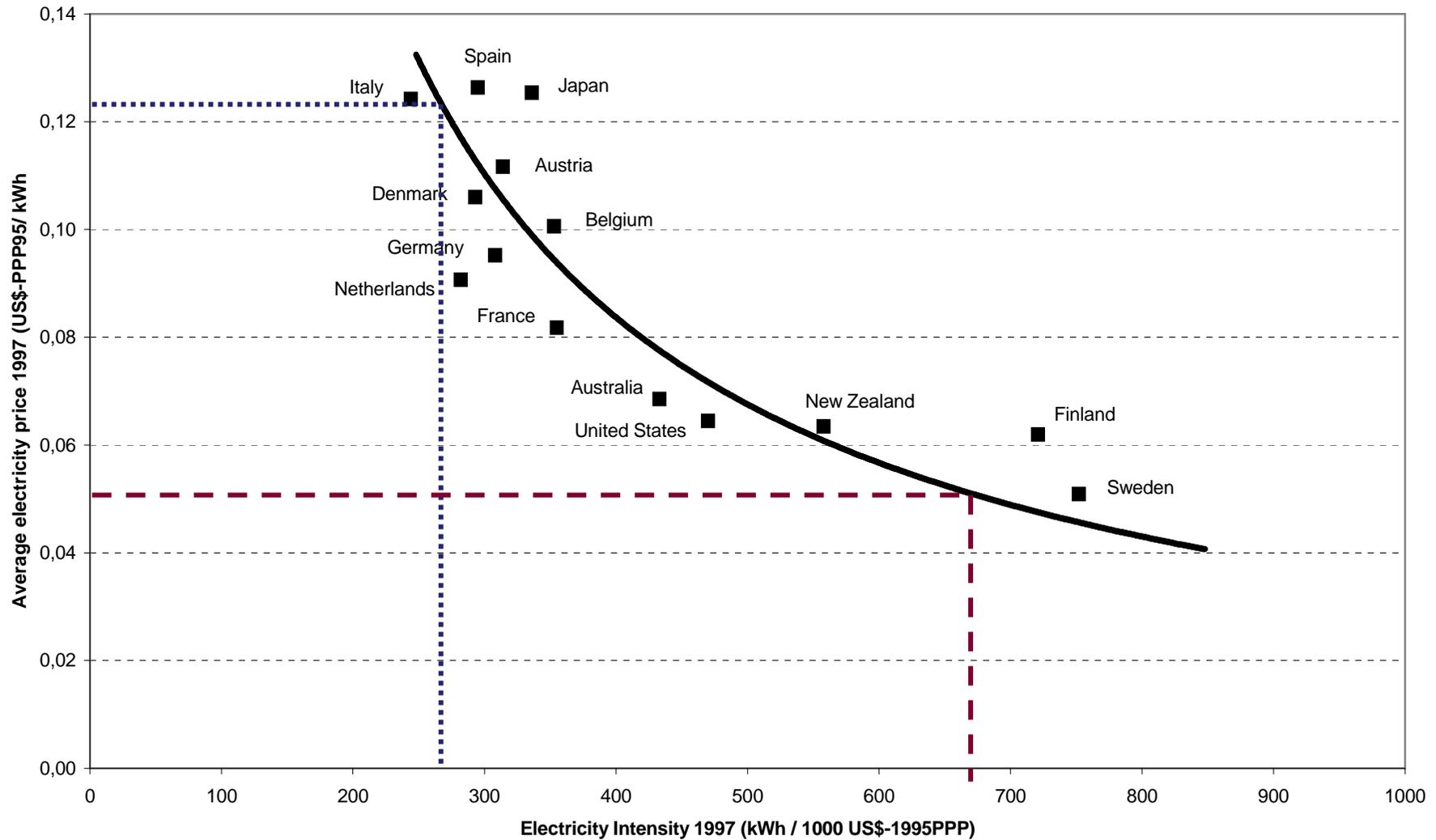*Affordable = what "we" are used to pay*
~willingness to pay
~income (ability to pay)
~customs, habits

Affordable is what keeps budget shares stable

Price x Intensity ≈ constant (1997)

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- **Sample uniform for income (GDP/capita) and for access to technology (global industry)**

- **Significant correlation between 'Intensity' and the end-use price of electricity**

- **Long-run price elasticity of intensity $\cong$ -1.0**

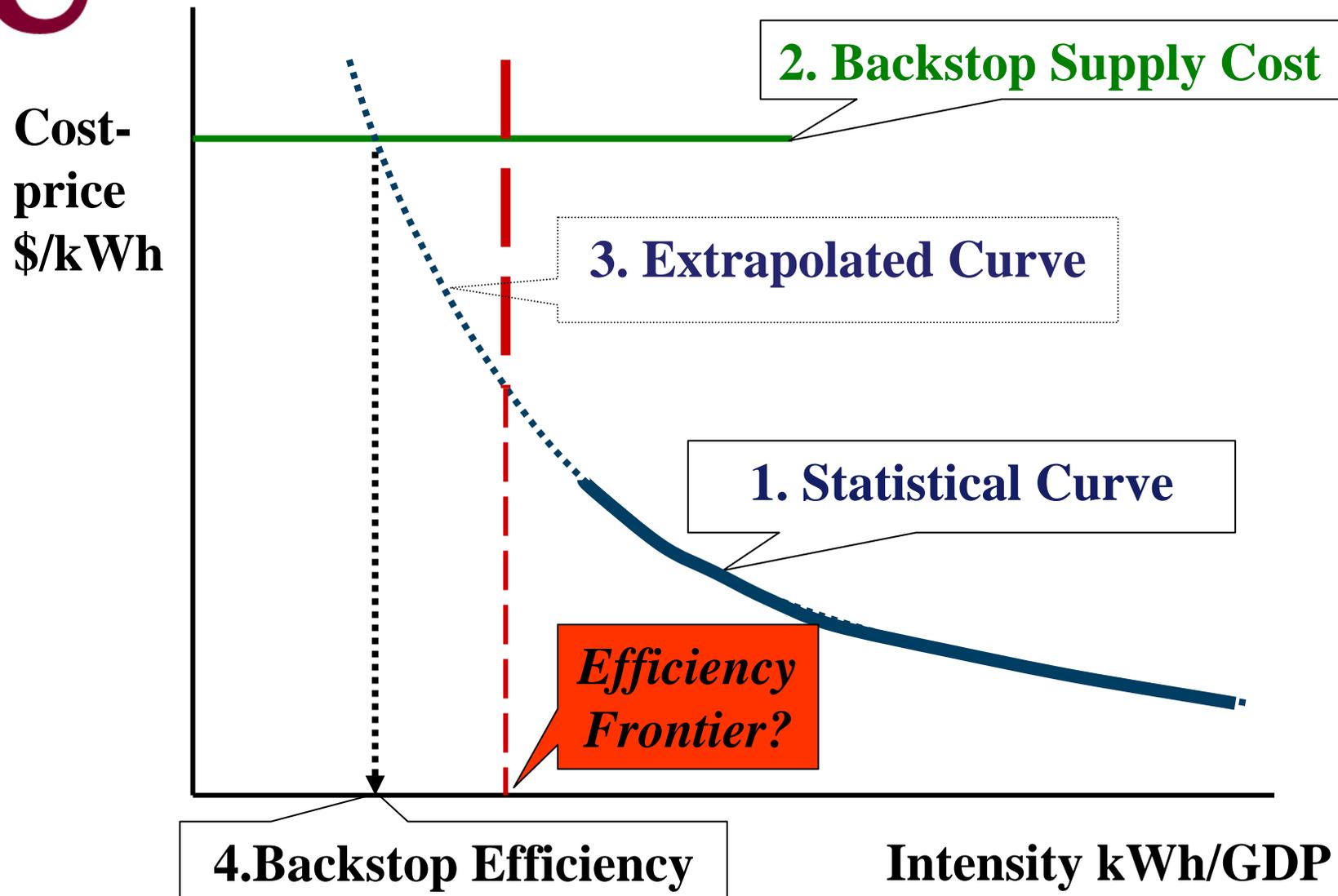- **GDP-Share of electricity bills [real costs] stays about constant independent of end-use prices applied**

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- **No <u>persistent</u> and <u>overall</u> efficiency without high end-use prices (taxes!)**
  >< Main goal of liberalizing electric sector
  >< Carbon Emission Trading with free permits
- **Prices do matter: households / companies behave rational and keep electricity bills / budget shares "affordable"**
- **High end-use prices are not devastating economies**

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Backstop End-use Efficiency

Is...	Renewable energy		
Necessary?	Yes: the only sustainable backstop		
Desirable?	$\sim$ majority (50^{++}): Yes		
Feasible? •Technical •Economical •Political	T: Yes E: Yes, IF efficiency is at backstop level		

Is...	Renewable energy	Backstop efficiency	
Necessary?	Yes	Yes	
Desirable?	~ maj. Yes	~ 50$^+$ No, because effort and costs needed	
Feasible? •Technical •Economical •Political	T: Yes E: Yes, IF efficiency is backstop	T: limit? E: Yes, IF tax policy keeps end-prices on high track	

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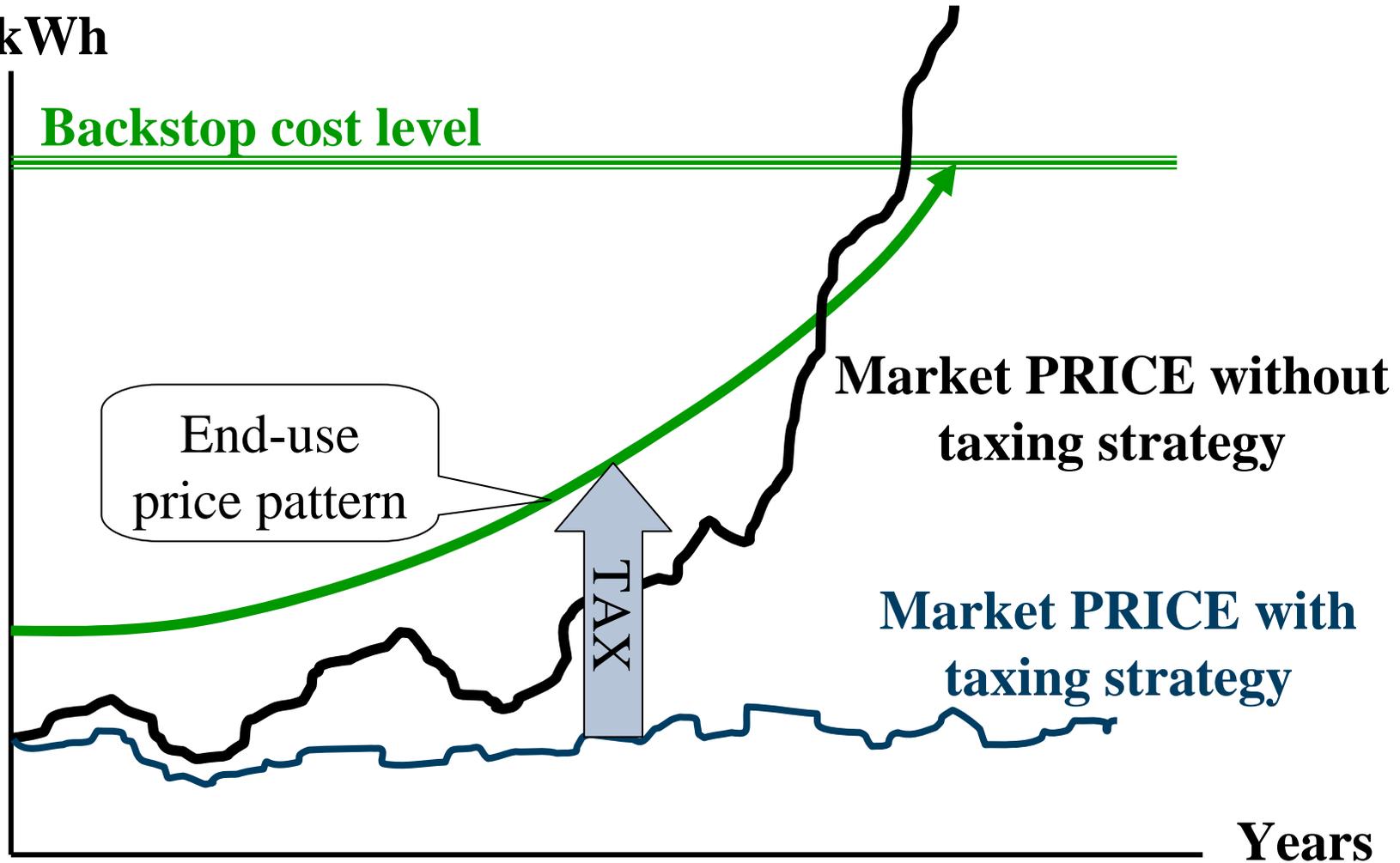| Is...	Renewable energy	Backstop efficiency	Energy tax policy
Necessary?	Yes	Yes	Yes
Desirable?	~ maj. Yes	~ maj. No	Many: No!!!
Feasible? •Technical •Economical •Political	T: Yes E: Yes, IF efficiency is backstop	T: limit? E: Yes, IF tax policy	T: Yes E: Yes GDP% constant P: difficult

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Taxing Strategy

$/kWh

Backstop cost level

End-use price pattern

TAX

Market PRICE without taxing strategy

Market PRICE with taxing strategy

Years

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Nuclear as backstop?

Unlimited?	•Breeders failed •Fusion ever feasible economically?
Globally accesible?	•Capital & technological intensive •Proliferation (e.g. Israël, Iran, etc.)
Ecological inpasbaar?	•Low carbon intensity •Isotopes and waste
Low risks?	•Societal risk judgement: no insurance •How expensive is safe nuclear?

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Nuclear and Renewables future

- **Serving the concentrated loads: competition nuclear ~ gas CCGT and CHP ~ 'clean' coal**

- **Transitory role for nuclear? Not a truely strategic question, if not abused to block sustainable solutions**

- **Renewables are the long term backstop technology (PV, wind, geo, hydro, biomass, wave, tidal, ...) at least for distributed loads**

  ? Are renewables affordable

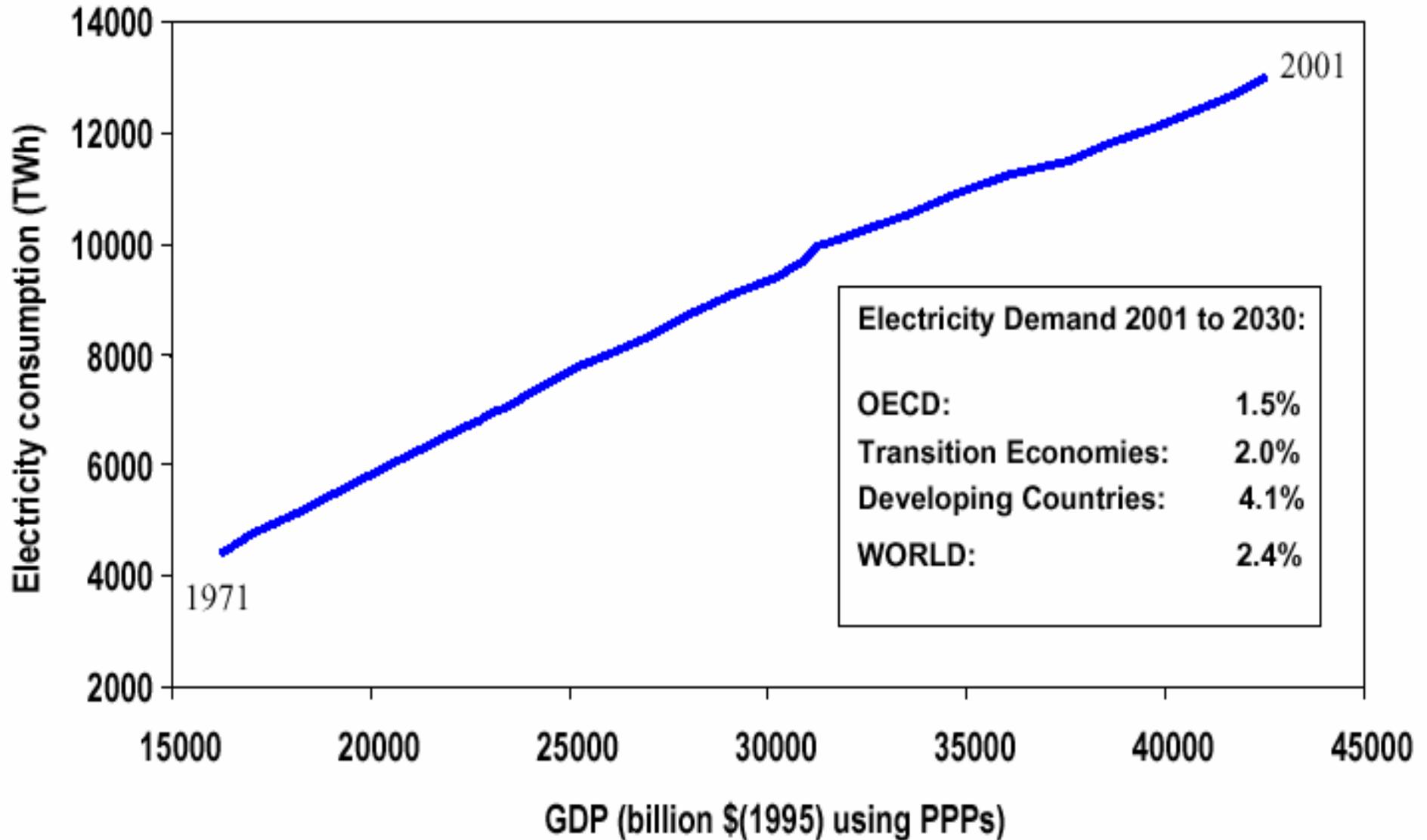 *as backstop supply technologies ?*

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Electricity as Energy Indicator

- ☑ **Growing importance in realising comfort and productivity in industrial economies**
- ☑ **Dispersed – diffuse – hidden end-use ⇨ belief is: price elasticity "almost zero"**
- ☑ **Quotes: "less electricity or higher prices will harm the economy significantly"**
- ☑ **Electricity supply is a 'hot' policy subject (nuclear power, renewables, deregulation)**
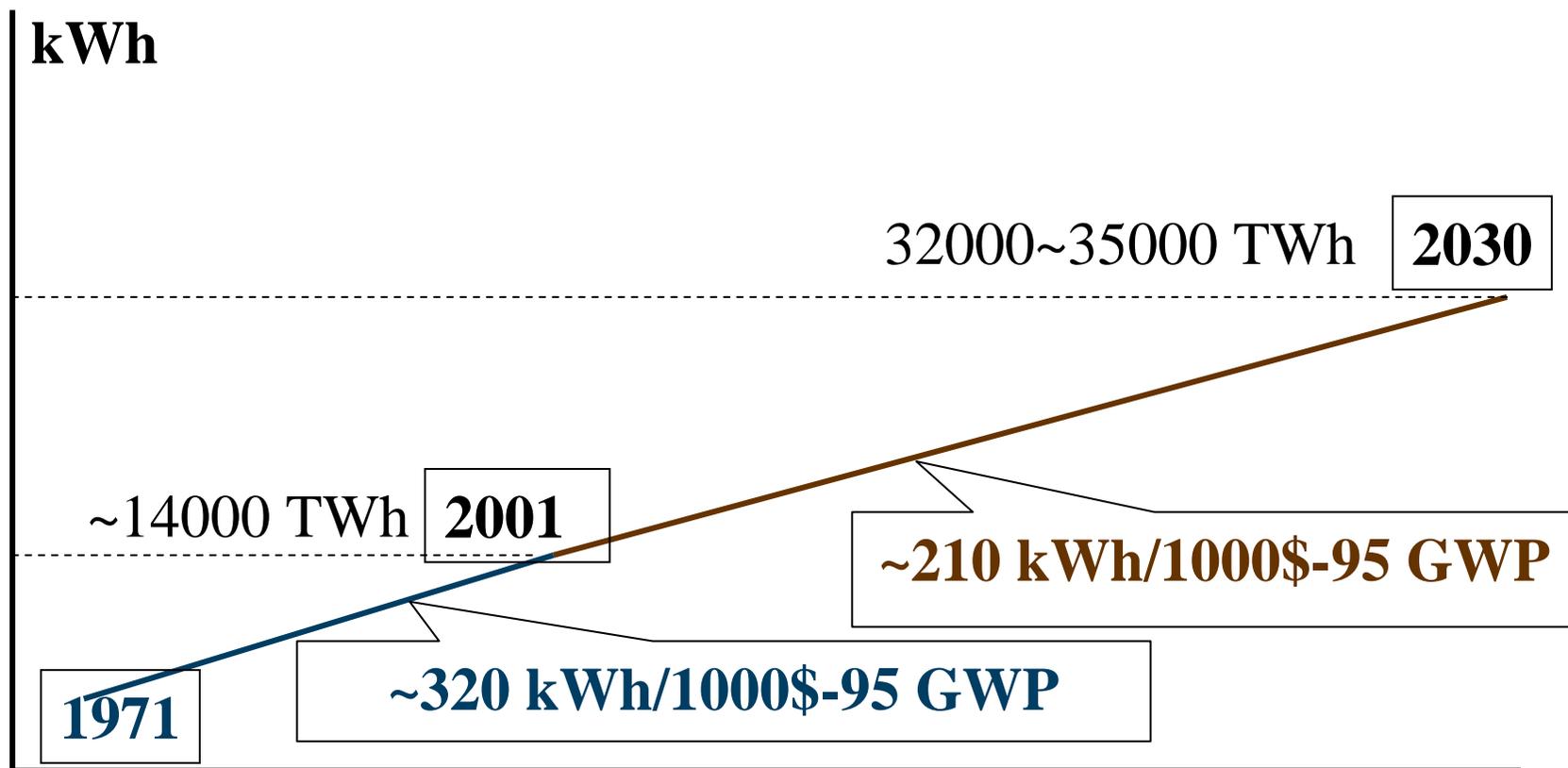
Electric Intensity of Wealth 1971-2001 (IEA)