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Global Energy Investment Challenges

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World Energy Outlook 2002: Key Strategic Challenges

- security of energy supplies
- threat of environmental damage caused by energy use
- uneven access of the world's population to modern energy
- investment in energy infrastructure

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Oil

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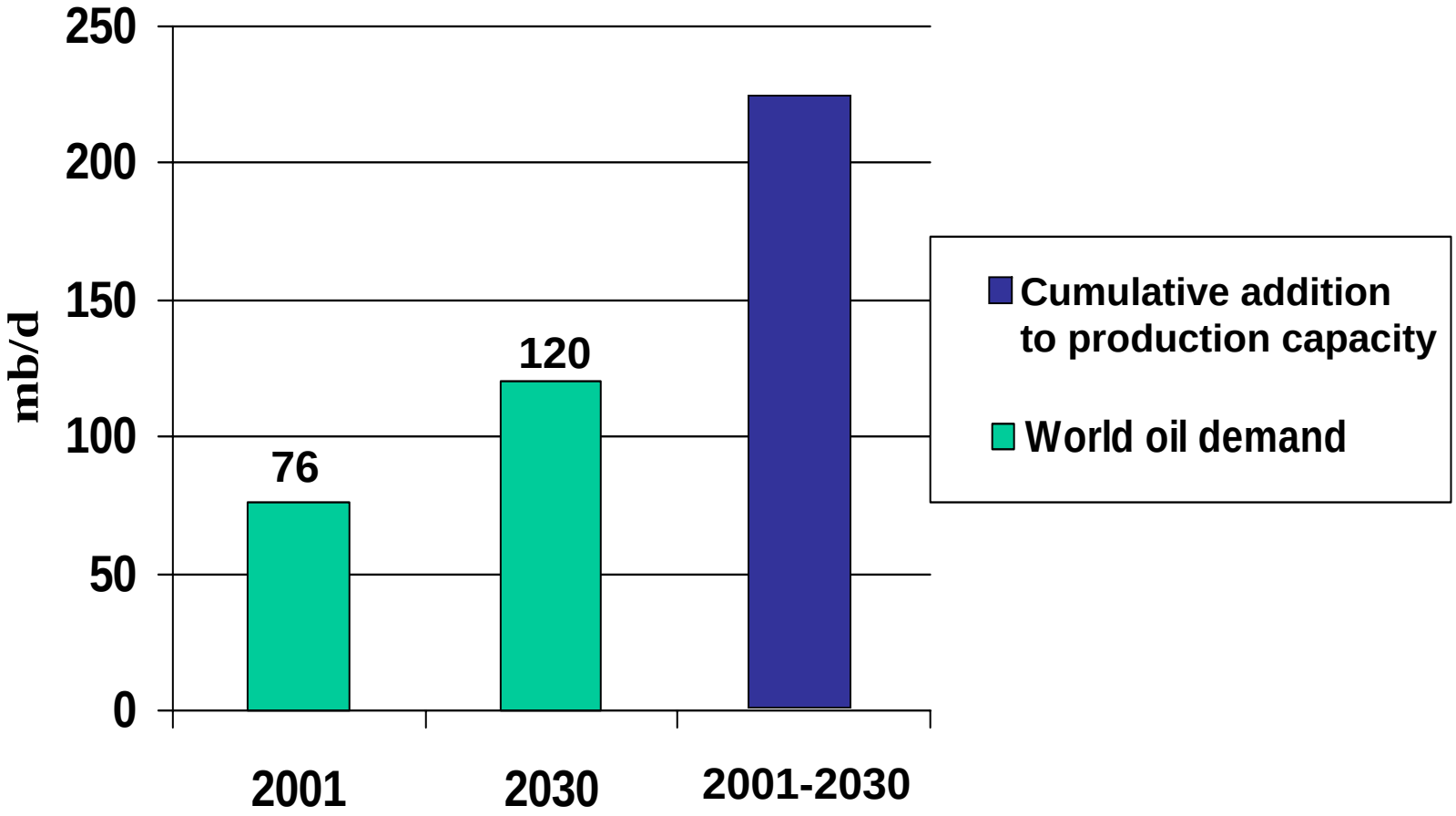
World Oil Production Capacity Outlook



Decline rates are a key long-term determinant of upstream capacity investment requirements

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Gas

World Gas Upstream Investment Outlook

- **Current production capacity: 2800 bcm**
- **Projected capacity 2030: 5300 bcm**
- **Additional capacity requirement between today and 2030: 10 000 bcm *(ca. 350 bcm/year)***
- **Substantial new capacity needed to compensate the declines in existing fields- especially in US**

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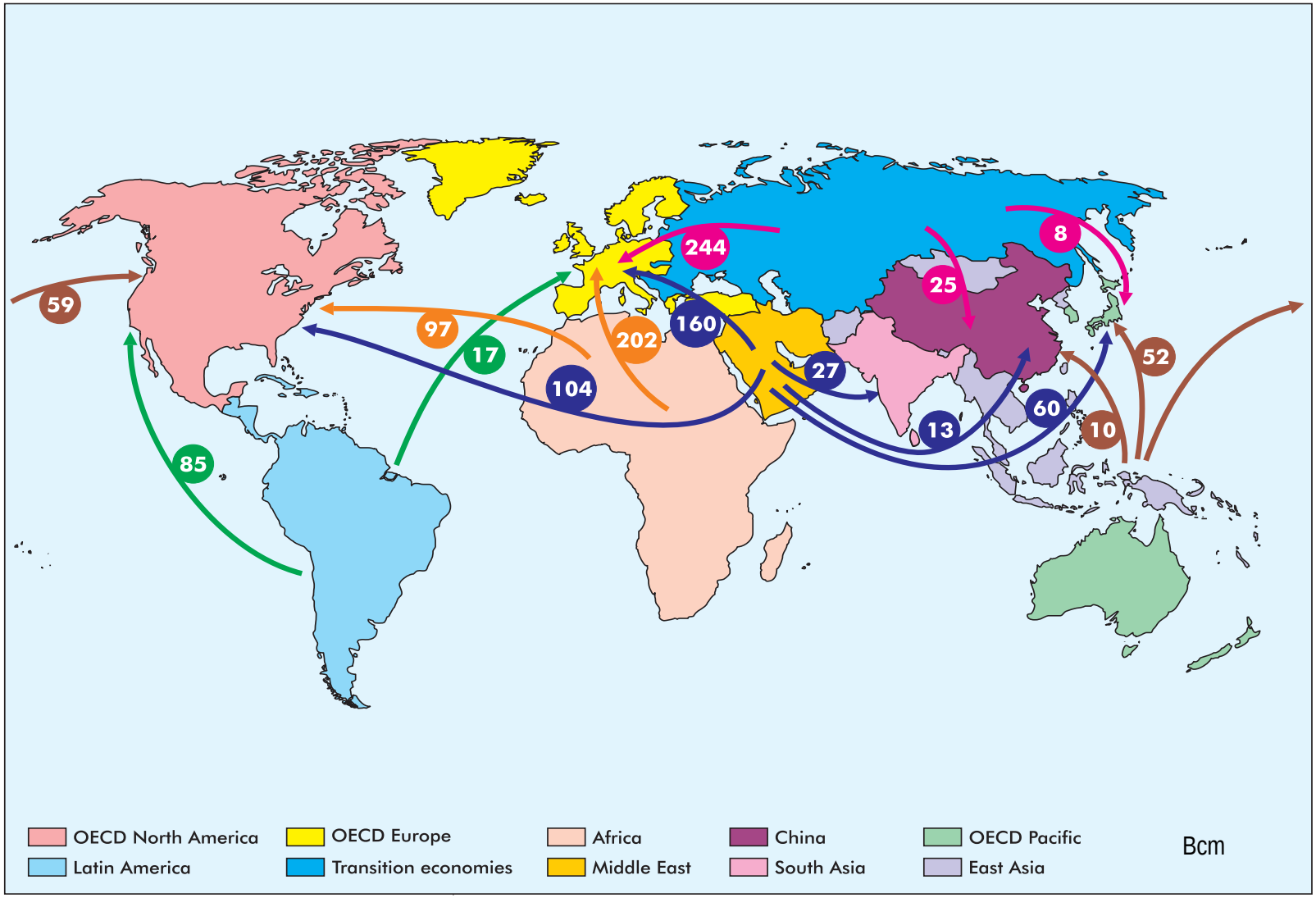
Global Gas-Trade Flows, 2030



The Middle East overtakes the transition economies as the world's biggest gas-exporting region

World Gas Investment Outlook

- Global gas trade will increase by more than three times. LNG trade is set to quintuple
- The share of LNG in trade will grow from 30% now to 50% in 2030 assuming further cost reductions
- The shipping fleet will increase from 128 tankers today to over 450 in 2030- some w/o long-term contracts
- The length of gas transmission and distribution pipelines will double

Electricity

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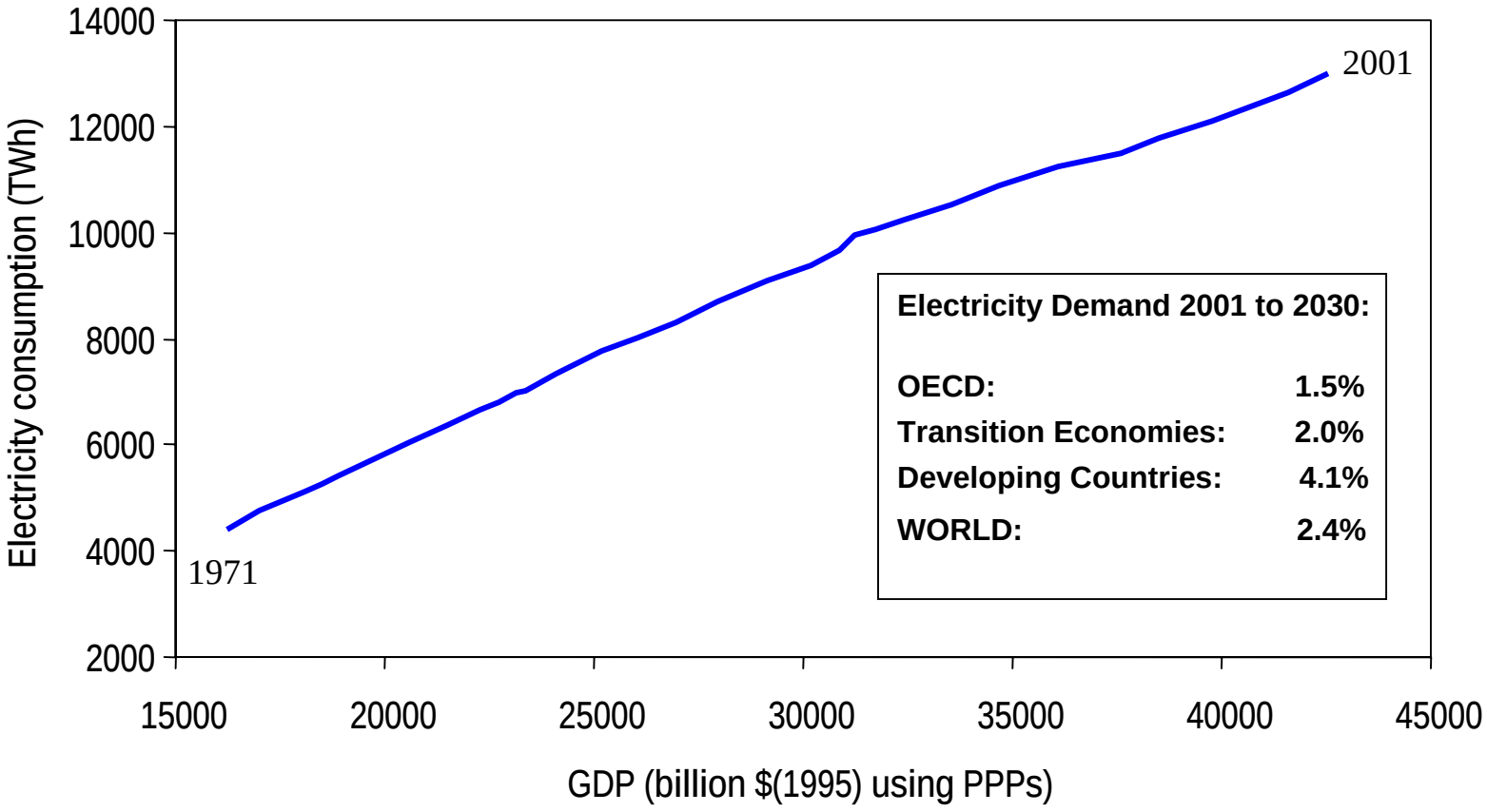
World Electricity Consumption vs. GDP 1971-2001



World electricity demand is set to increase rapidly

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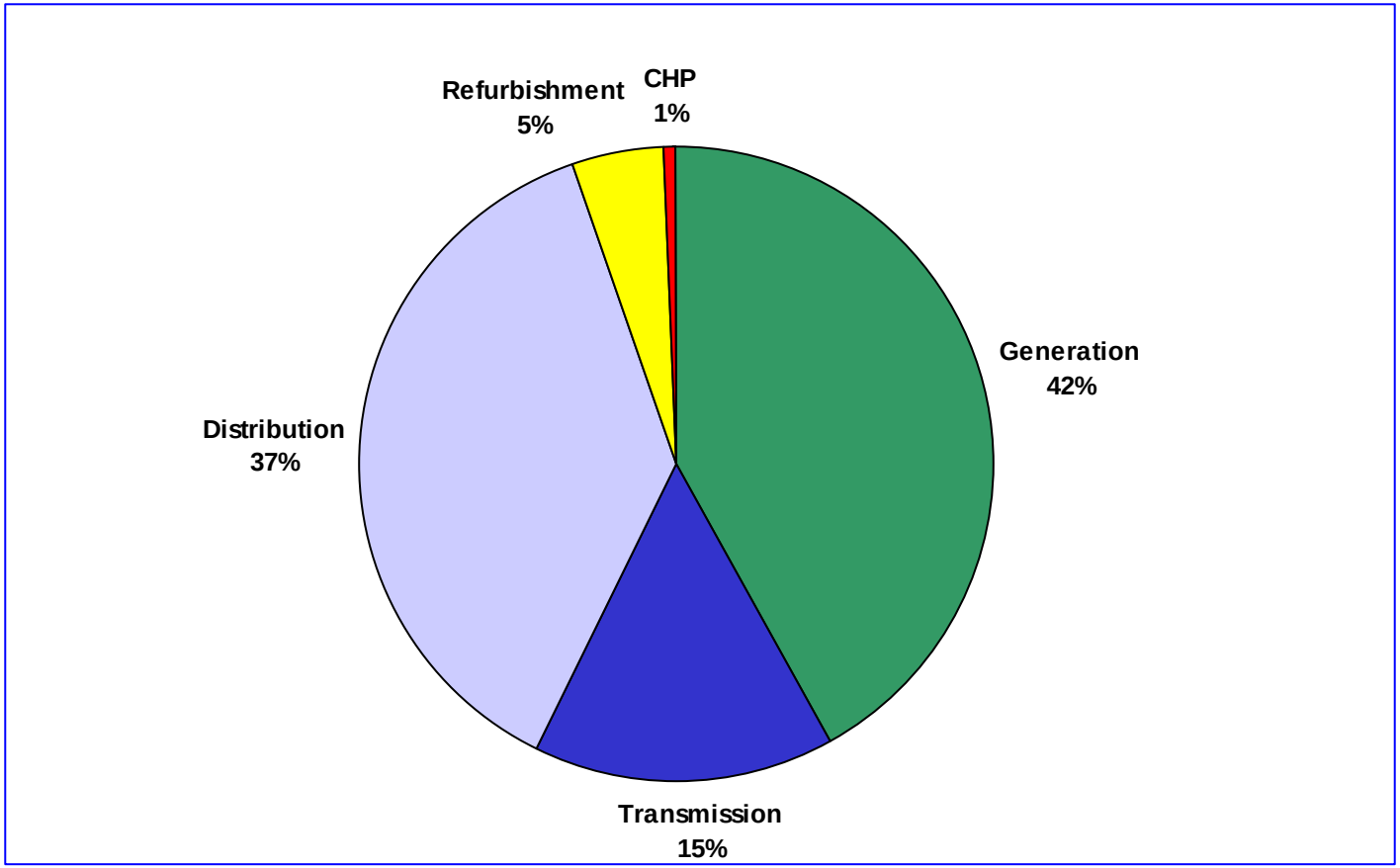
World Electricity Investment Outlook to 2030



Massive investment will be required in the power sector to meet demand growth and to replace/maintain existing infrastructure

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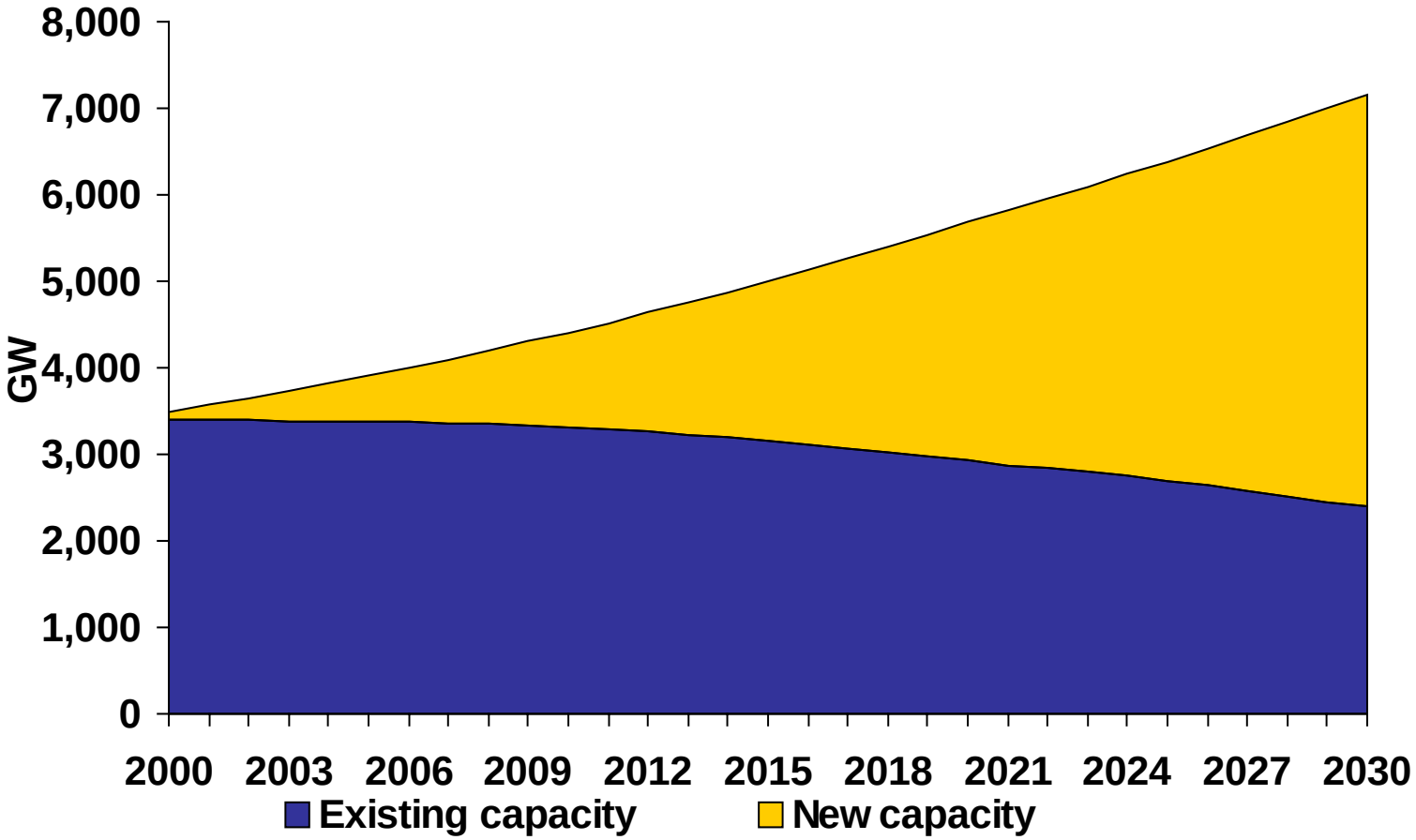
World Installed Power-Generation Capacity



Nearly 5,000 GW of capacity needs to be built in 2000-2030, almost half in developing countries

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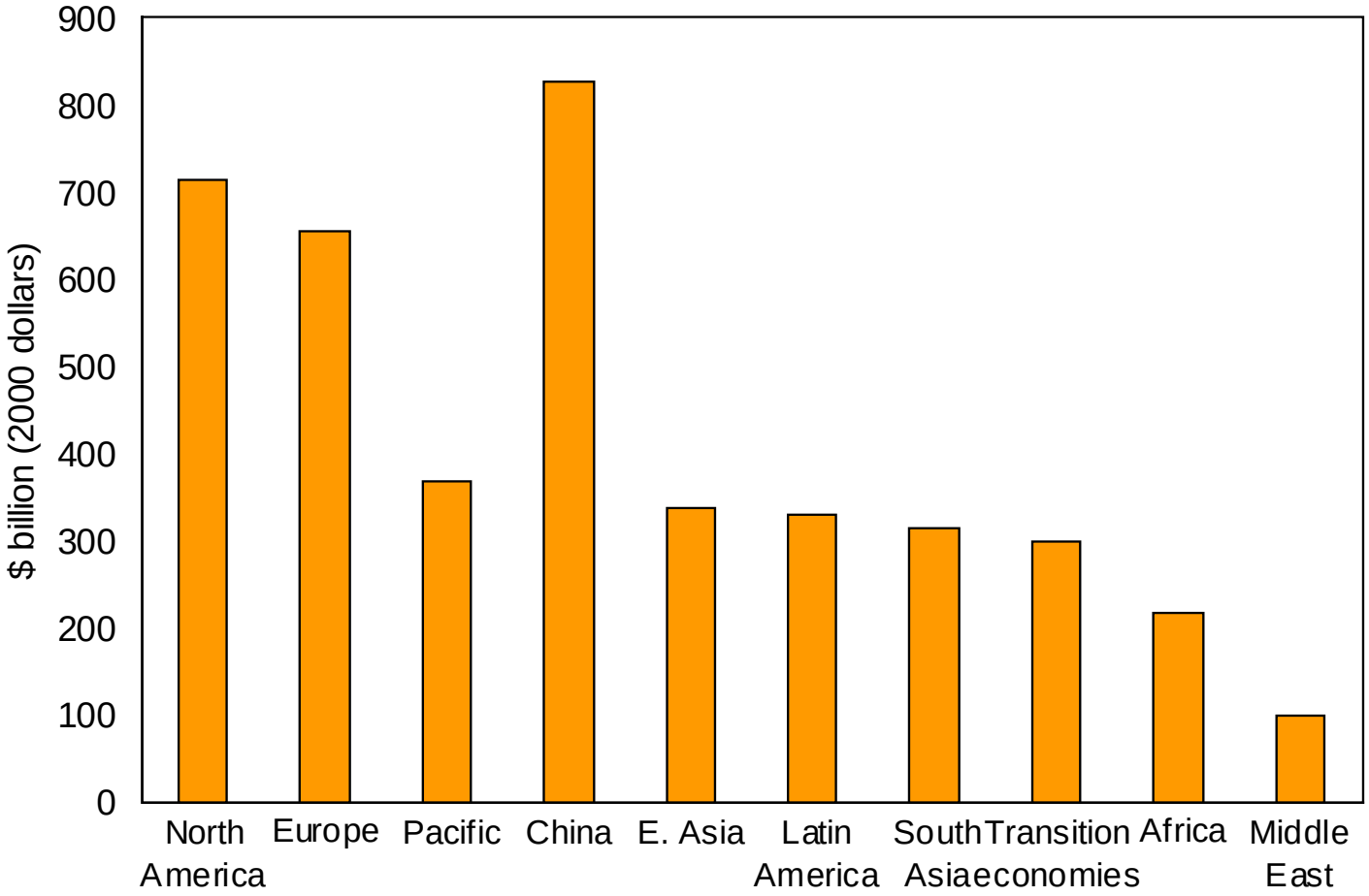
World Power-Generation Investment, 2000-2030



Cumulative worldwide investment in new power plants amounts to $ 4.2 trillion, more than half in developing countries

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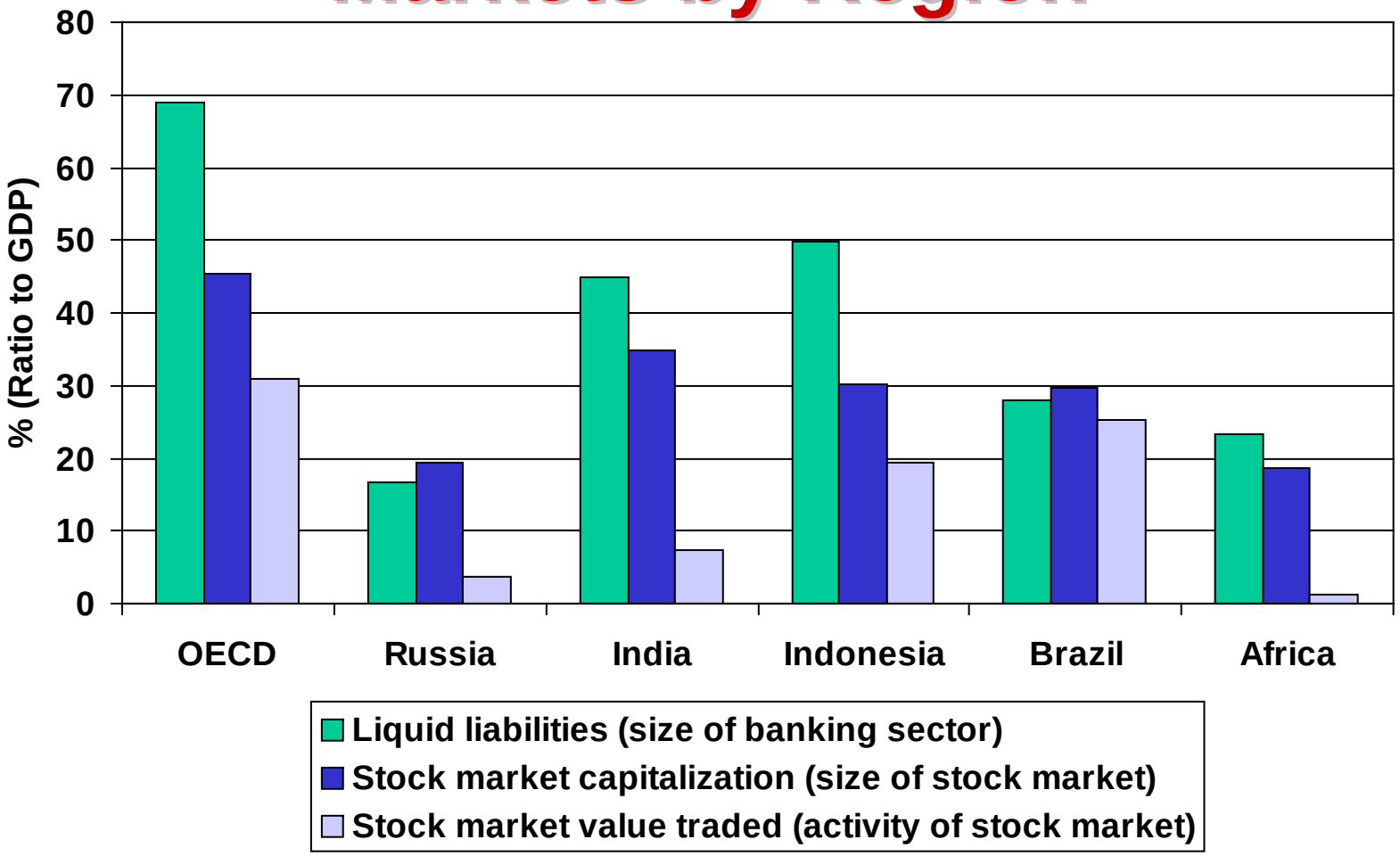
Size and Activity of Financial Markets by Region



Financial markets in non-OECD regions are smaller, less active and less efficient.

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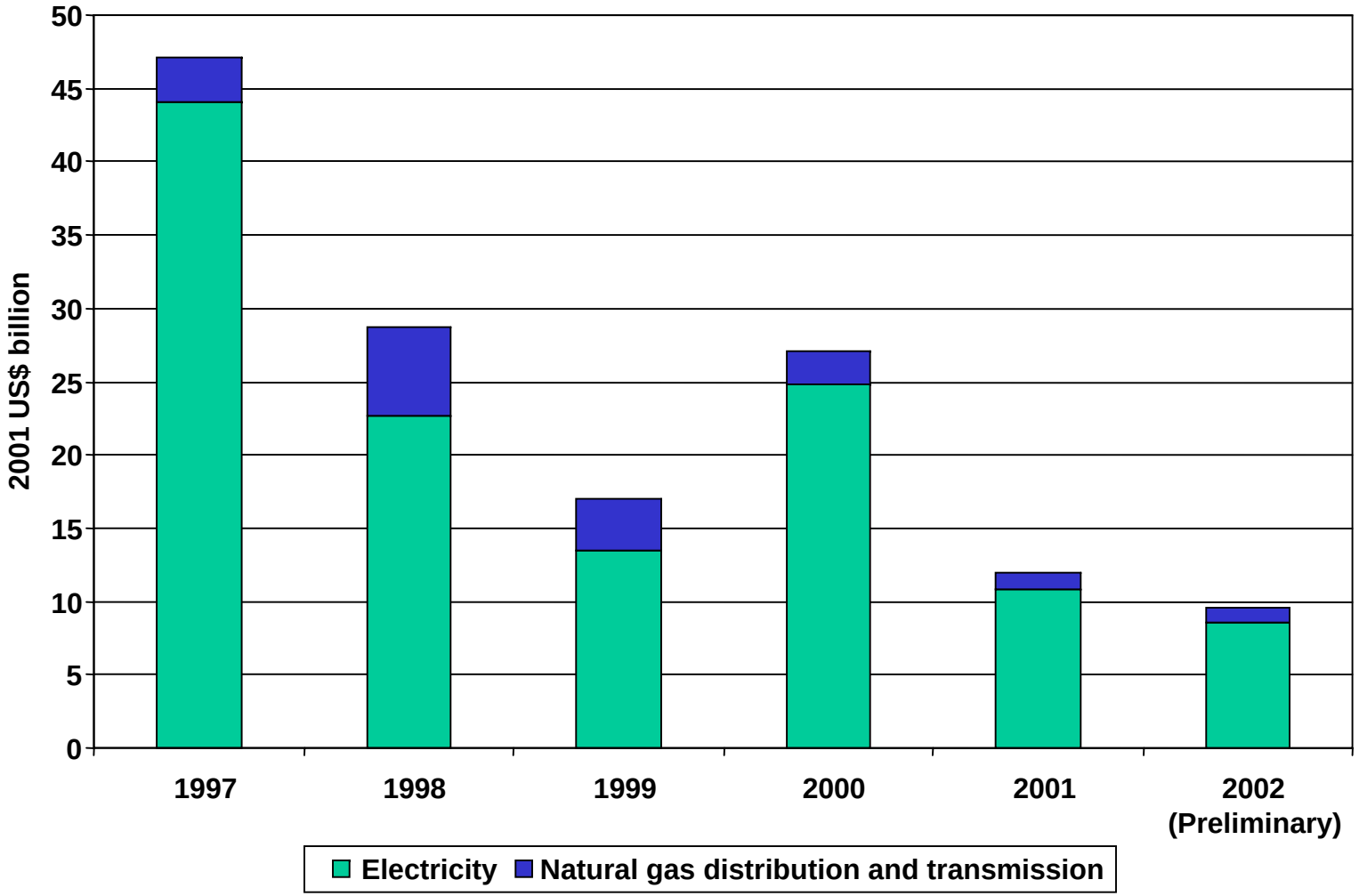
Investment Flows into Energy Projects with Foreign Private Participation



Sound macroeconomic management and legal/regulatory framework are needed to secure the availability of foreign capital to energy projects.

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Installed Capacity in EU-15

584 GW
Installed Capacity 2000

−

290 GW
Retirements 2000-2030

+

618 GW
New Capacity 2000 - 2030

=

901 GW
Installed Capacity - 2030

Capacity additions over the next 30 years will be larger than today's installed capacity

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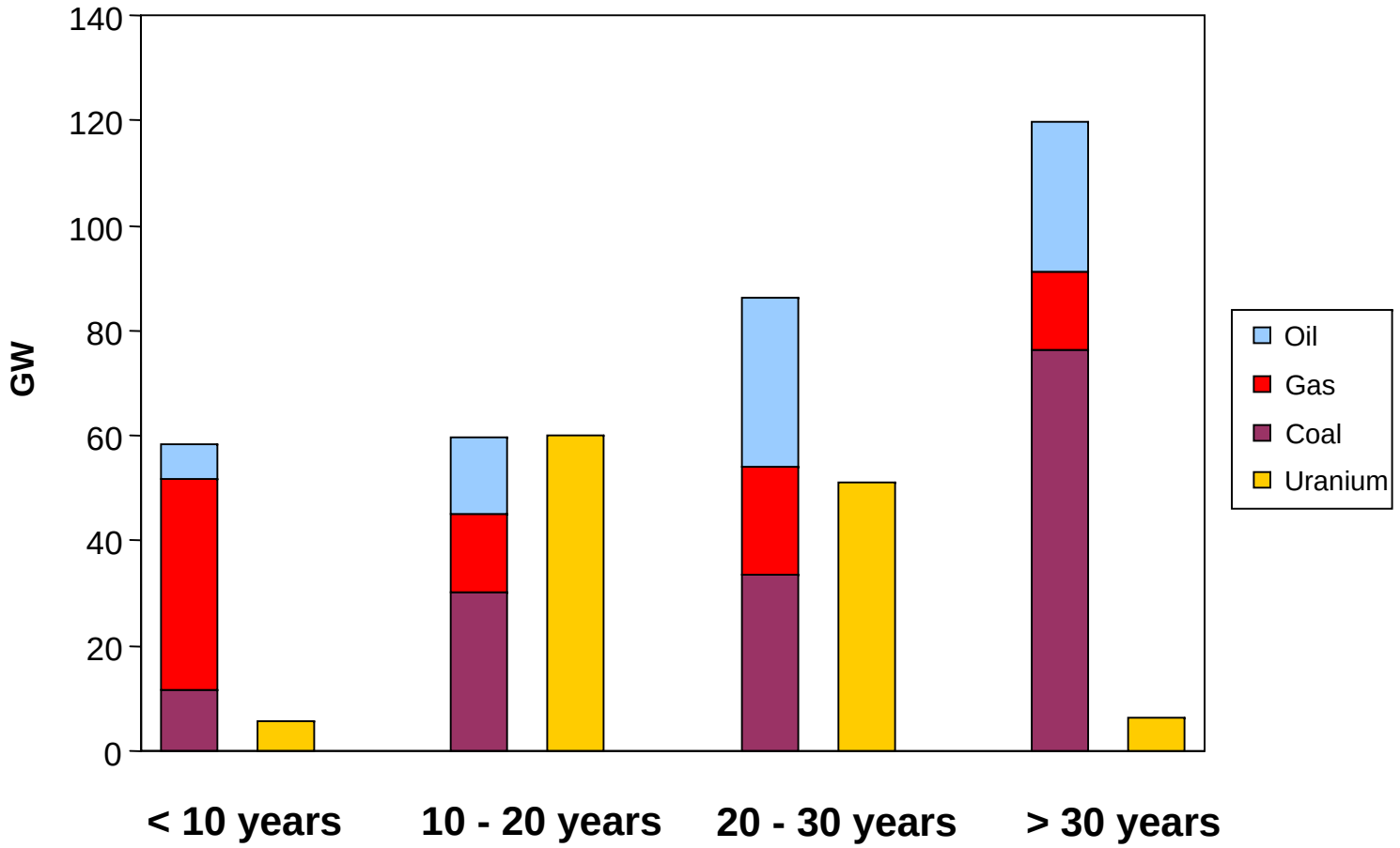
Age of Installed Capacity in EU 15



Europe's power plants are ageing: half current capacity - mostly coal-fired - could be retired by 2030

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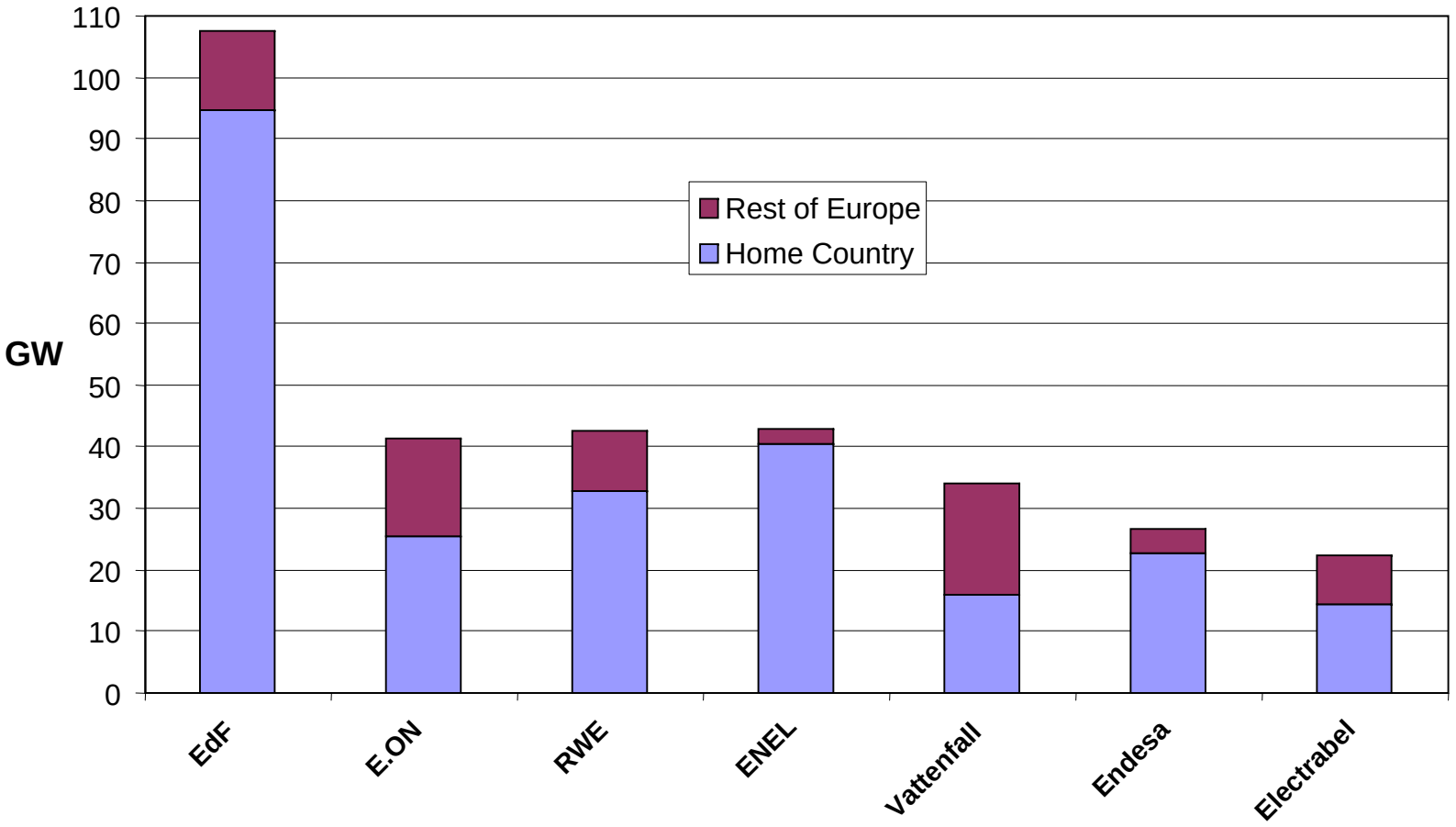
Capacity in EU 7 Major Utilities (2002)



Concluding Remarks-1

- Electricity is overwhelmingly the largest sector - and most of rest is oil and gas
- Bulk of energy investments will shift to developing countries and transition economies
- Capital is available globally but issue is cost and balance of risk/return
- FDI and international capital markets need to play growing role in financing non-OECD investments

Concluding Remarks- 2

- Oil/Gas: Decline rates - key long-term uncertainty for upstream investment requirements
- Gas: Unit production/transportation costs still falling, but longer supply chains will drive up overall cost to key markets, and thereby boost investment needs
- Gas/Electricity: questions on overall impacts of liberalisation on investments
- Electricity in DCs: inadequate local capital markets- limited access to international capital