

Green Economies: The Global Context



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Worldwatch Institute

- Toward a Green Economy: What's in it for Brazil?
- Rio de Janeiro, 6 October 2010

What is a Green Economy?

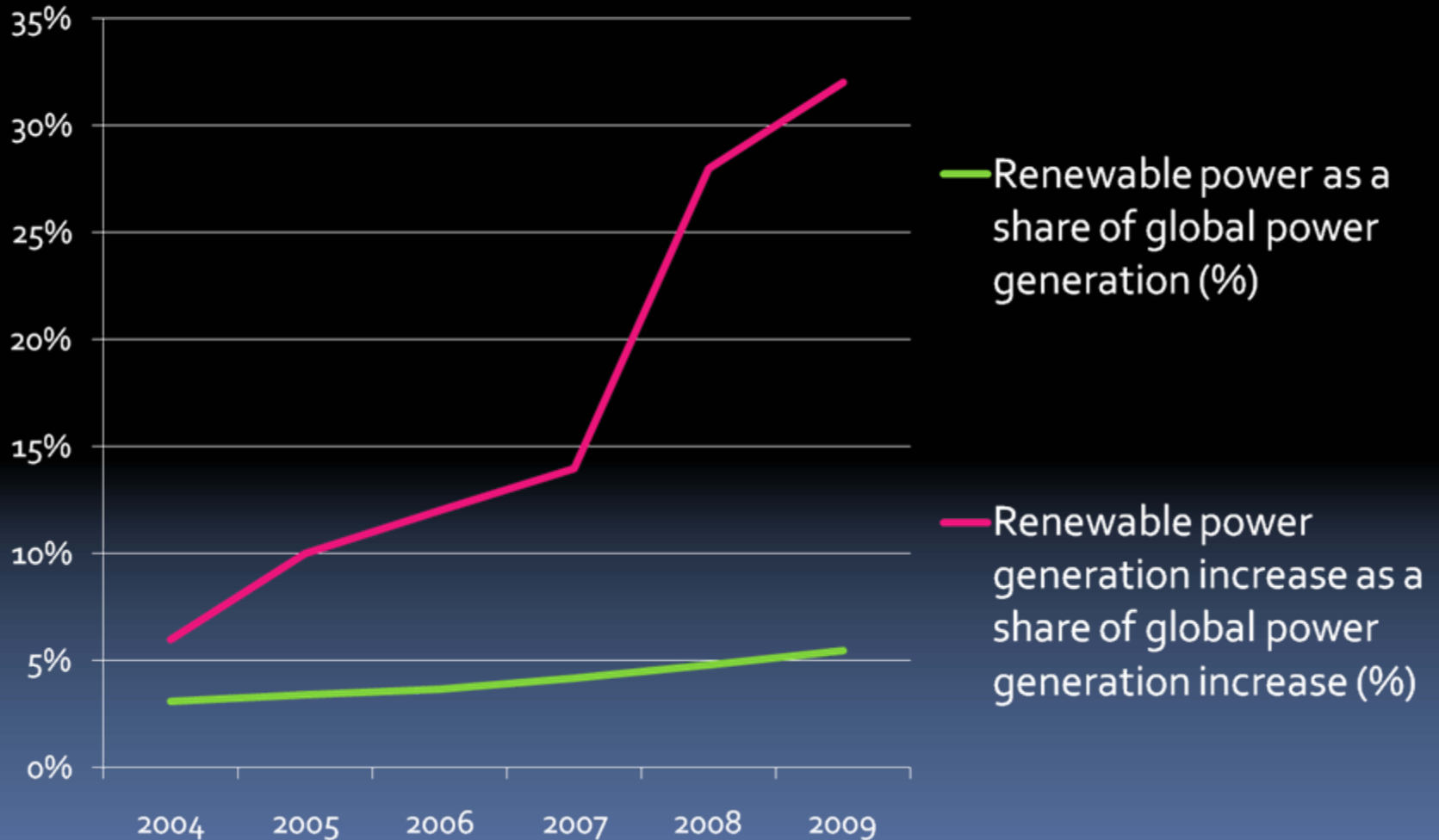
- No established definition
- Often covers
 - clean energy
 - clean transportation
 - reduced waste and pollution
 - conservation of natural resources
- Some definitions add a social dimension

Four Points for Today

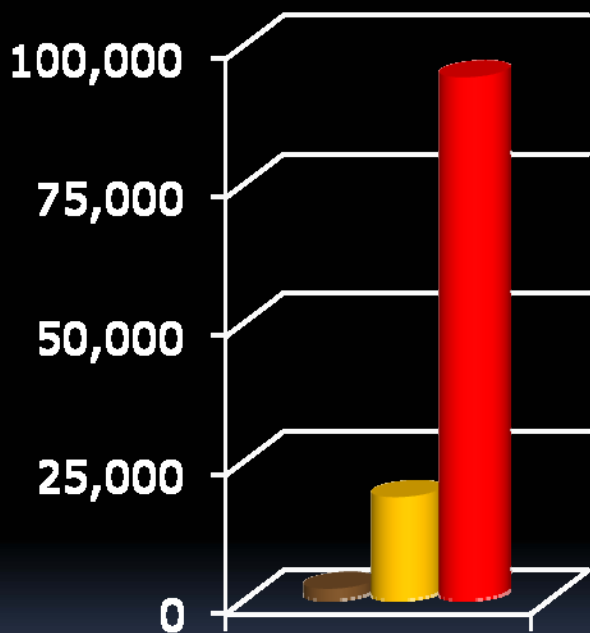
- Green Tech = Green Jobs
- Innovations in Resource Management
- Governments Stepping Up
- Toward the Future

Green Tech =
Green Jobs

Renewable power generation as a share of global power, 2004-2009



Global Growth of Renewables: 1990, 2000, 2007



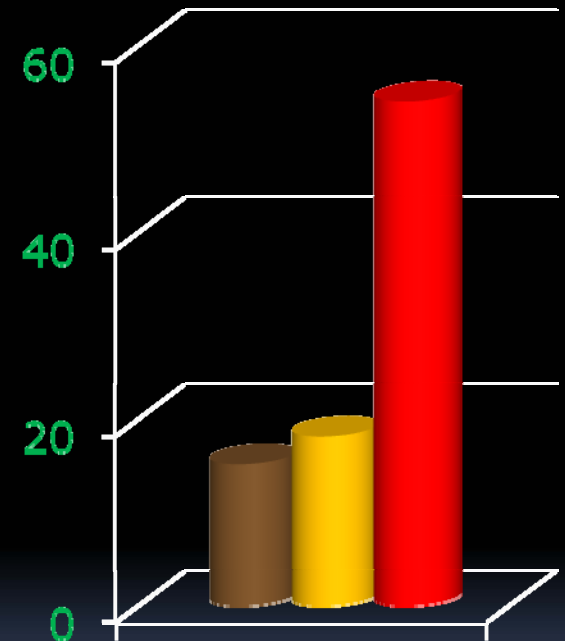
Wind

Megawatts of Total
Generating Capacity



Solar PV

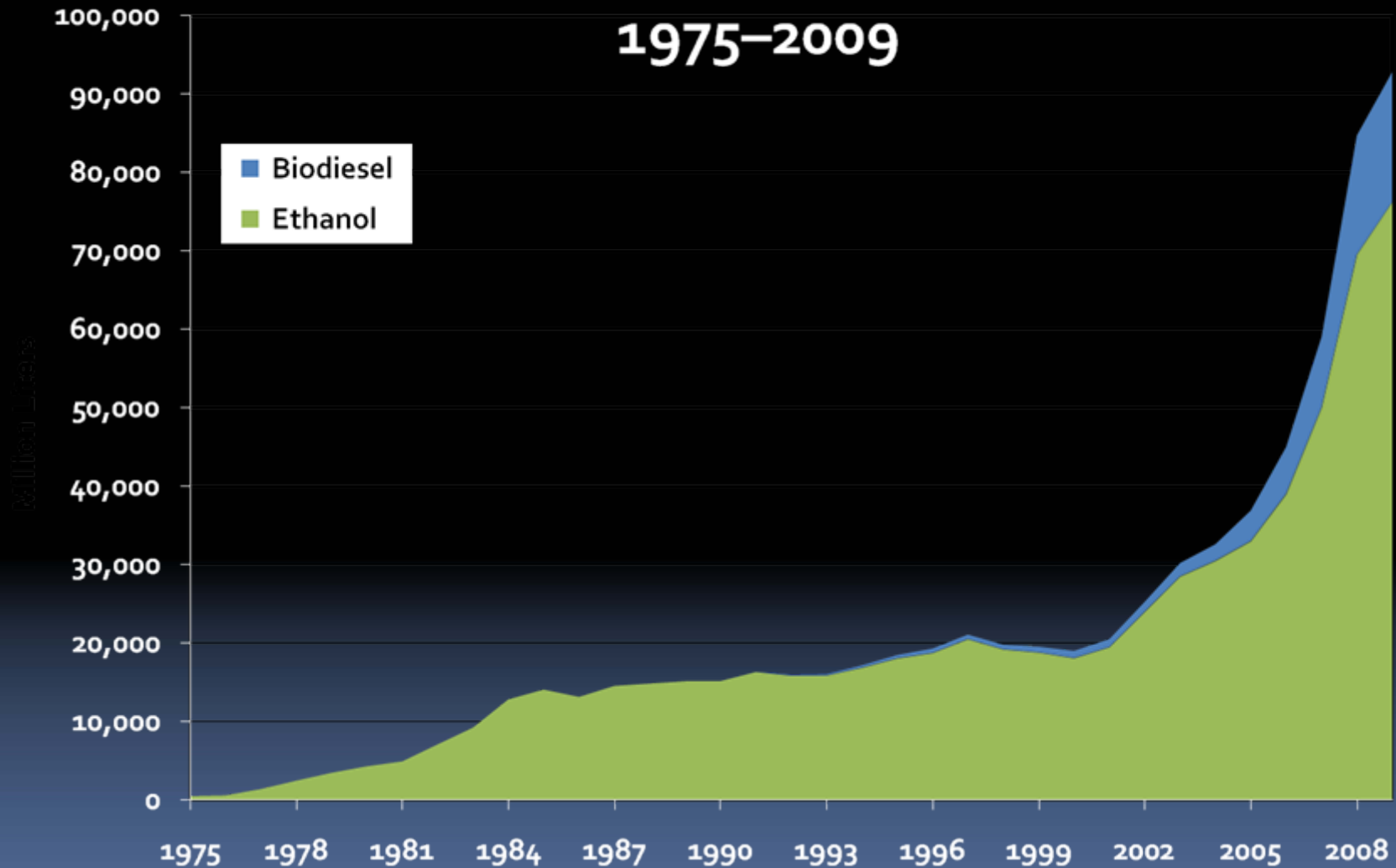
Megawatts of
Total Production



Biofuels

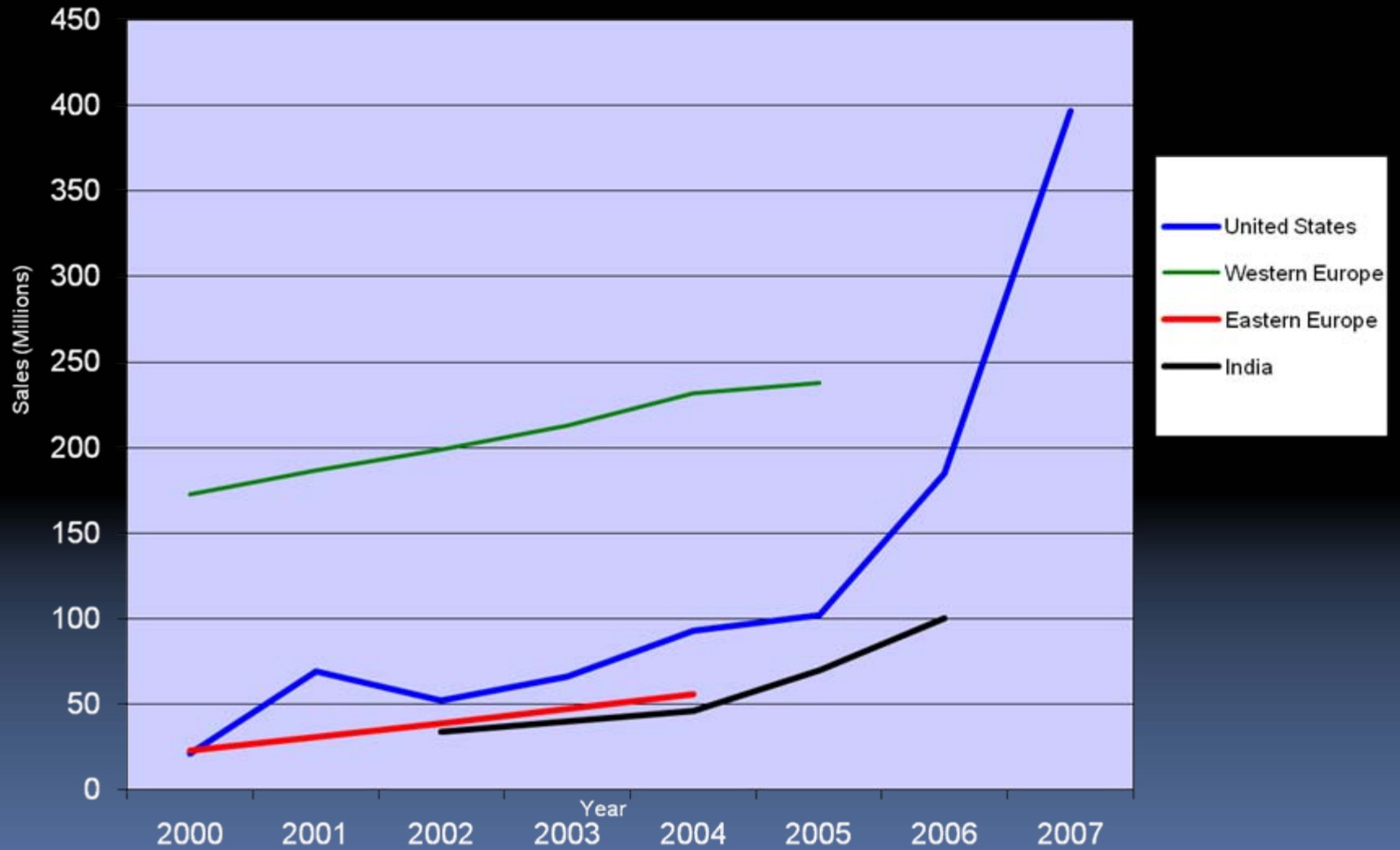
Billion Liters of
Total Production

World Ethanol and Biodiesel Production, 1975–2009



Source: F.O. Licht, REN21

CFL Sales, Selected Countries



New investment in sustainable energy, World, 2004-2009



Green Jobs Transformations - A Typology

| | |
|------------------------|---|
| Job Creation | Jobs gained in renewable energy; energy performance services; fuel efficient cars; public transportation |
| Job Elimination | Jobs lost in mining, logging, oil extraction, etc. Net employment effects ? |
| Substitution | Shifting <ul style="list-style-type: none">• from fossil fuels to renewables,• from automobiles to mass transit,• from waste disposal to recycling,• from primary metals to scrap production, etc. |
| Transformation | Existing jobs are greened as: <ul style="list-style-type: none">• workplace practices and methods change |
| Supply Chains | Traditional industries become suppliers for green industries (steel for wind turbines) |

Green Jobs? A Schematic Overview



Jobs in a Green Economy

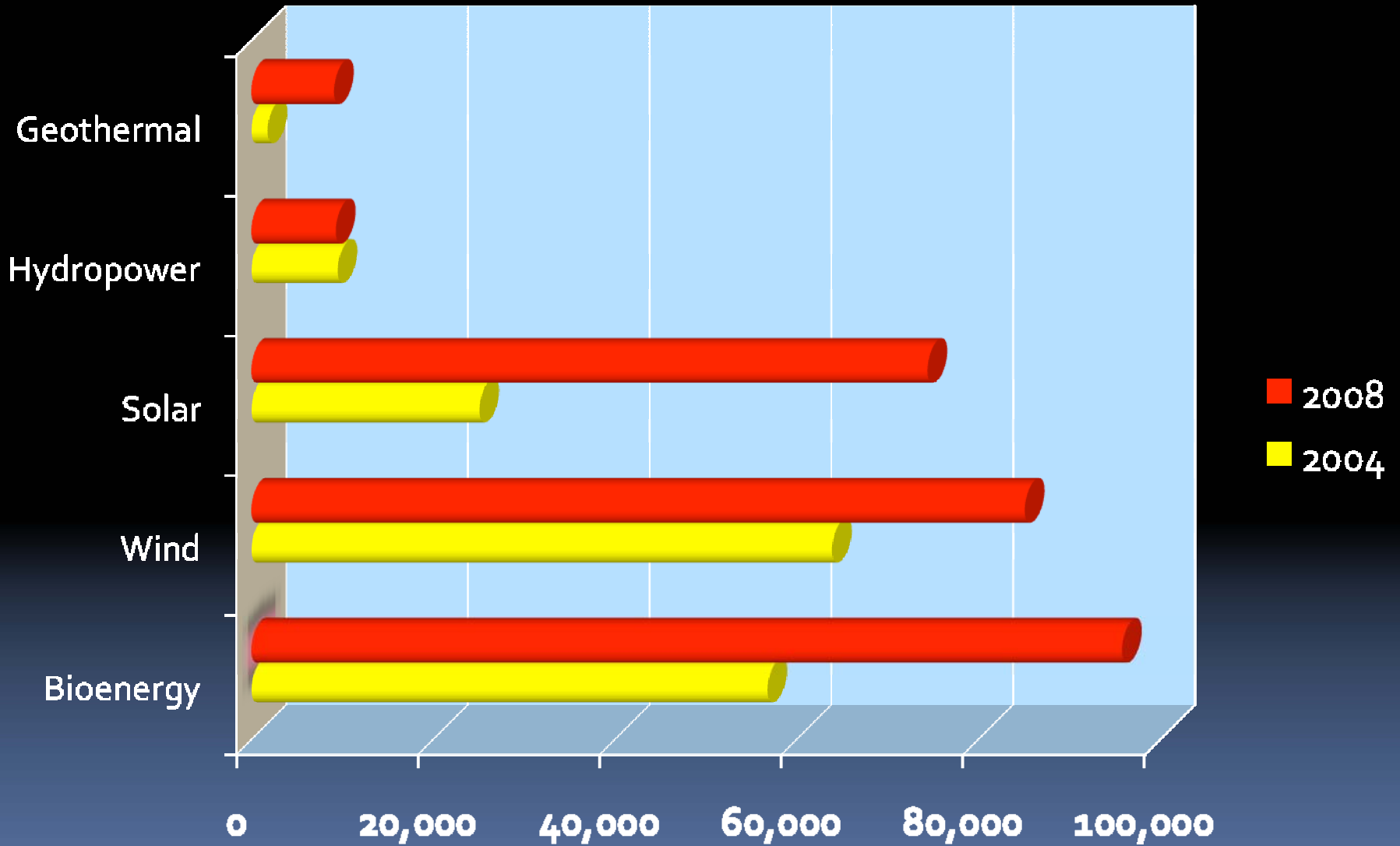
| Sector | Selected Job Types |
|------------------------------|---|
| Building Retrofitting | Electricians, HVAC Installers, Carpenters, Roofers, Insulation Workers, Construction Managers, Building Inspectors |
| Mass Transit | Civil Engineers, Rail Track Layers, Electricians, Welders, Metal Fabricators, Engine Assemblers, Locomotive Engineers, Conductors, Dispatchers |
| Wind Power | Anemometrists, Steel Workers, Millwrights, Sheet Metal Workers, Machinists, Electrical Equipment Assemblers, Structural Engineers, Industrial Production Managers |
| Solar Power | Electrical Engineers, Electricians, Industrial Machinery Mechanics, Welders, Metal Fabricators, Electrical Equipment Assemblers |

Source: Adapted from Political Economy Research Institute

Renewable Energy Jobs Today

| | World / Europe | Selected Countries | |
|---------------------------|--------------------------------------|---|---|
| Wind Power | 400,000 + 160,000 + | Germany U.S. Spain China Denmark Italy | 85,100 85,000 40,000+ 22,200 23,500 15,000 |
| Solar PV | 250,000 120,000 | China Germany Spain Italy | 82,800 57,000 26,800 1,700 |
| Solar Thermal | 624,000 + 30,000 + | China Germany Spain Italy | 600,000 17,400 9,100 3,000 |
| Biofuels / Biomass | 1,200,000 + | Brazil US China Germany | 500,000 312,200 266,000 95,800 |

Job Growth in Renewable Energy: Germany



A Shade of Green in the Auto Industry

| | European Union | Japan | United States |
|--|------------------|----------------|------------------|
| Passenger Car Manufacturing Workforce | 2,000,000 | 952,000 | 1,095,000 |
| Vehicles meeting ≤ 120 gram / CO₂ standard | 7.5 % | 6.3 % | n.a. |
| Vehicles achieving 40 mpg or more | n.a. | n.a. | 1.2 % |
| Est. Jobs in Manufacturing Efficient Cars | 150,000 | 62,000 | 13,000 |

Source: *Green Jobs: Towards Decent Work in a Sustainable, Low Carbon World*

Recycling / Scrap-based Production

| | Employment Estimates | |
|---------------------------|----------------------|------------|
| All Recycling | China | 10,000,000 |
| | United States | 1,100,000 |
| | Brazil | 500,000 |
| Aluminum Can Collecting | Brazil | 170,000 |
| Electronics Recycling | China | 700,000 |
| | | |
| Steel Scrap Production | United States | 30,000 |
| | World | [225,000] |
| Aluminum Scrap Production | Japan | 12,700 |
| | Western Europe | >10,000 |
| | United States | 6,100 |

A Darker Shade of Green -- Public Transport

| | Employment Estimates | |
|---------------------------------|----------------------------------|-----------------------------------|
| Railways (Operations) | China India European Union | 1,800,000 1,500,000 900,000 |
| Railways (Manufacturing) | European Union | 140,000 |
| Urban Mass Transit | European Union United States | 900,000 367,000 |

Source: *Green Jobs: Towards Decent Work in a Sustainable, Low Carbon World*

Innovations in natural resource management

Environmental Markets, 2008

| Market | Value in 2008 |
|------------------|-----------------|
| Regulated Carbon | \$117.6 billion |
| Water Quality | \$9.25 billion |
| Biodiversity | \$2.9 billion |
| Voluntary Carbon | \$0.7 billion |
| Forest Carbon | \$.04 billion |

Growth in Carbon Markets

| | Volume (MtCO ₂ e) | | Value (US\$ million) | |
|--------------------------------|------------------------------|------|----------------------|---------|
| | 2008 | 2009 | 2008 | 2009 |
| Total Voluntary Markets | 127 | 94 | 728 | 387 |
| Total Regulated Markets | 4713 | 8625 | 134,415 | 143,897 |

Watershed Protection, 2008

- **288** programs globally, up from 51 in 2000
- Payments for Watershed Services (PWS)—incentives to adopt practices that improve watershed services (**Lat Am is a leader**)
- Water Quality Trading (WQT)—standards set by government; water quality goals met by trading pollutant reduction credits.
- Value of Transactions: **\$9.256 billion**

■
Source: Ecosystem Marketplace

Governments Stepping Up?

How Green a Stimulus?

| | Total | Green Stimulus | | RE | CCS | Bldg. | Vehicles | Rail | Grid |
|-----------------|--------------|----------------|-----------|-------------|-------------|-------------|-------------|-------------|-------------|
| | € Billion | € Billion | % | € Billion | | | | | |
| EU | 30 | 18 | 59 | 0.5 | 9.7 | 2.2 | 1.5 | | 3.8 |
| Germany | 81 | 11 | 13 | | | 8.0 | 0.5 | 2.2 | |
| France | 26 | 6 | 21 | 0.7 | | 0.6 | | 1.0 | 3.2 |
| UK | 24 | 2 | 7 | | | 0.2 | 1.1 | 0.3 | |
| Italy | 80 | 1 | 1 | | | | | 1.0 | |
| Spain | 11 | < 1 | 6 | | | | | | |
| Other EU | 239 | 5 | 2 | 1.5 | | 0.3 | 3.0 | | |
| Total EU | 490 | 42 | 9 | 2.7 | 9.7 | 11.4 | 6.1 | 4.5 | 7.0 |
| <i>World</i> | <i>2,161</i> | <i>337</i> | <i>16</i> | <i>19.4</i> | <i>15.5</i> | <i>51.6</i> | <i>12.3</i> | <i>94.1</i> | <i>70.9</i> |

Source: IEBC Global Research

Fuel Economy, New Passenger Vehicles

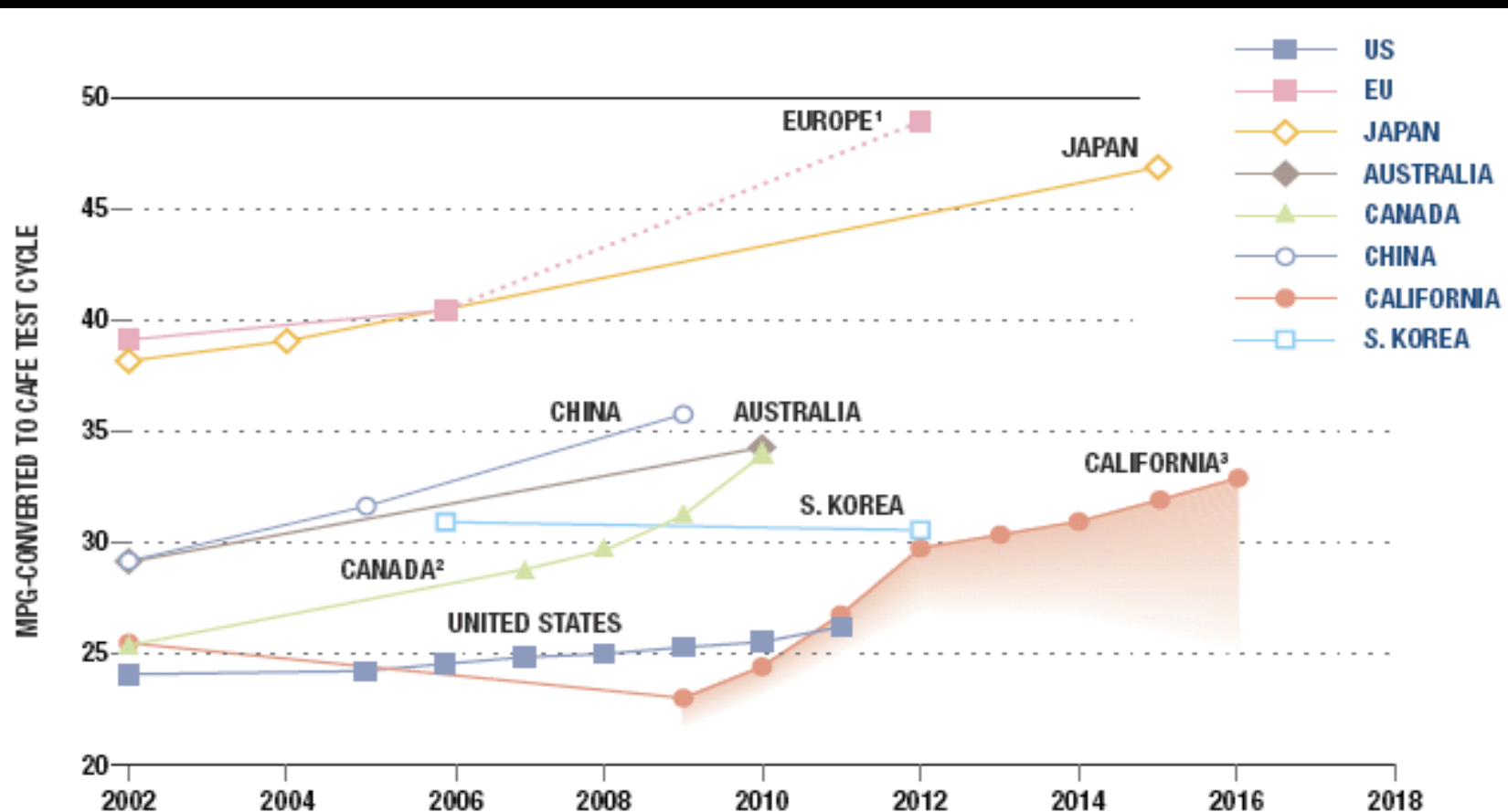
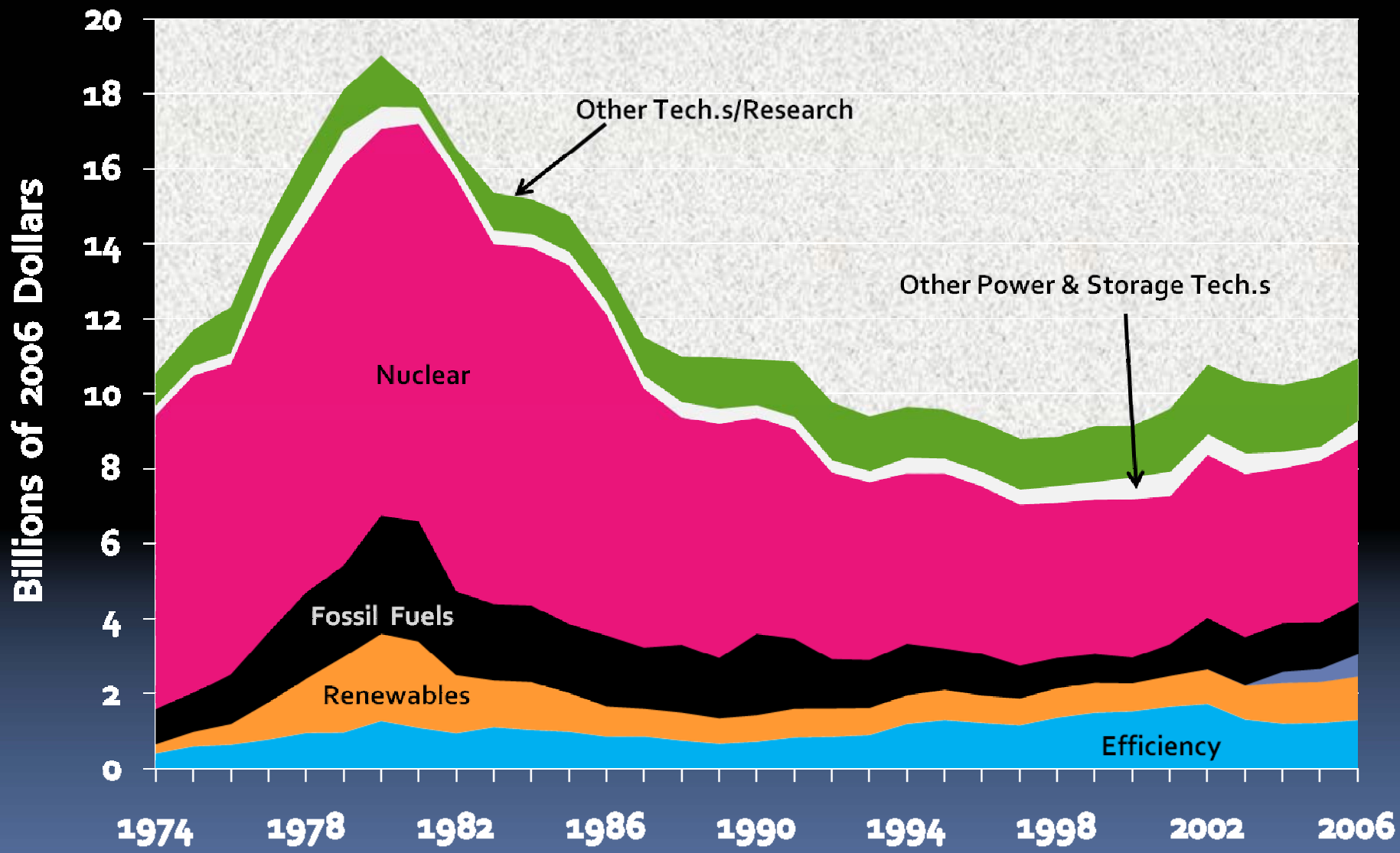


FIGURE ES-2. Actual and Projected Fuel Economy for New Passenger Vehicles by Country, 2002-2018.

Source: International Council on Clean Transportation, 2007

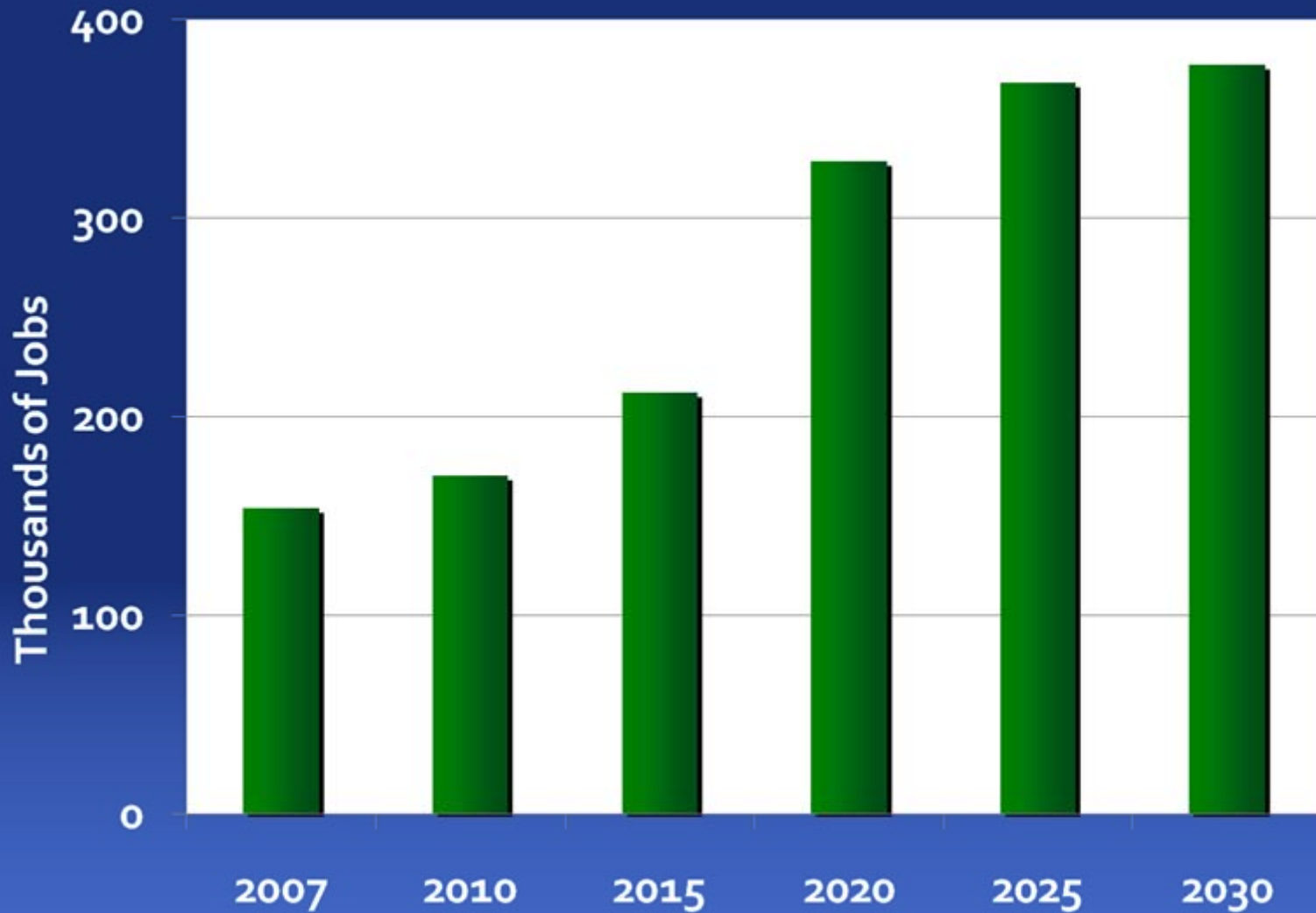
IEA Energy R&D Budgets, 1974-2006



Source: International Energy Agency

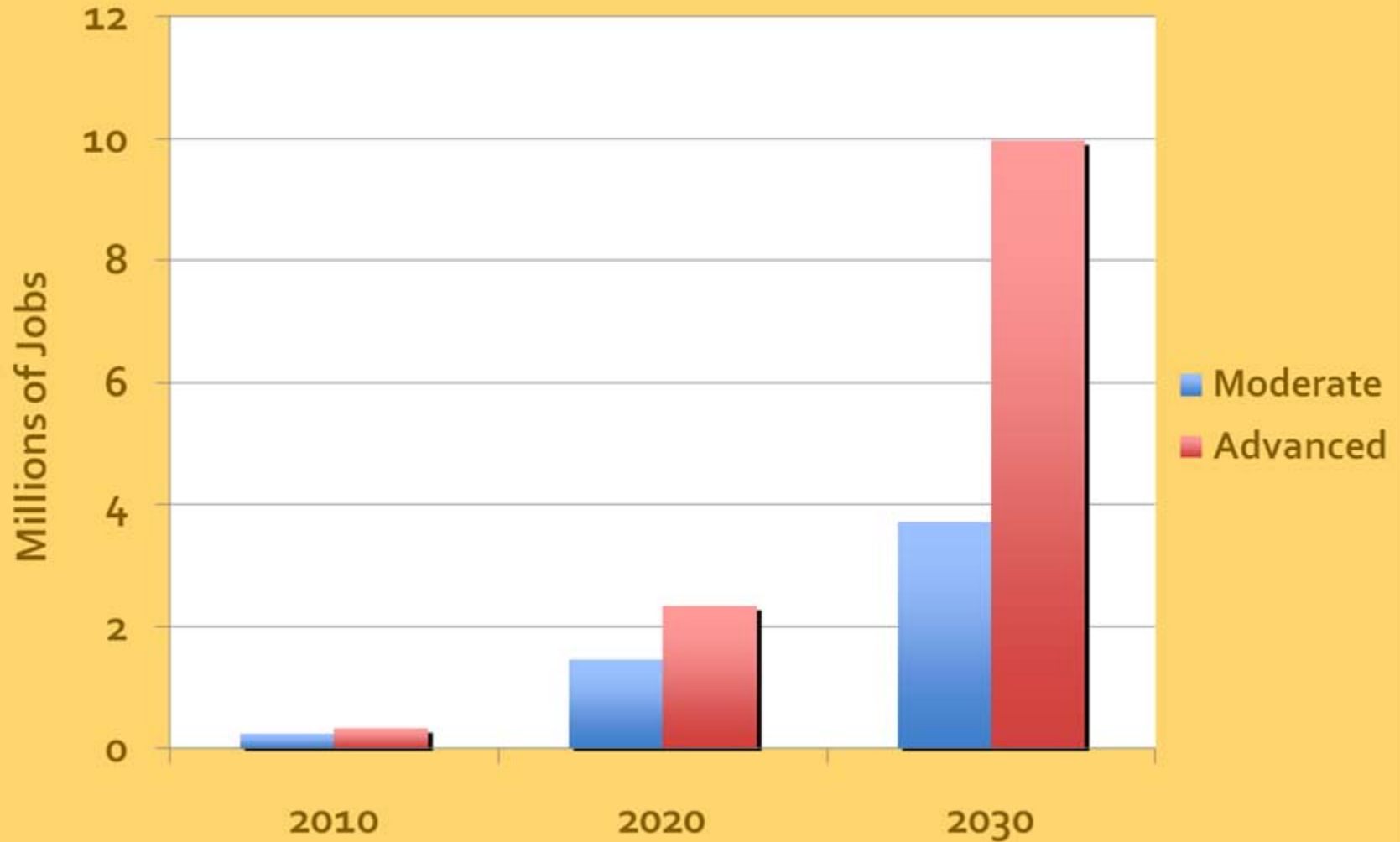
Toward the Future

Wind Power Employment Projections – Europe



Source: EWEA, Wind at Work (2009)

Solar PV Employment Projections – World



Source: Solar Generation V (2008)