



15th IAEE European Conference 2017

“Heading Towards Sustainable Energy Systems: Evolution or Revolution?”

3rd to 6th September 2017, Hofburg Congress Center, Vienna, Austria

Innovation in the Energy Sector:
Which Technologies do we need after 2030 and which
policies do we need now?

Innovation from the perspective of the Developing World

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Vienna
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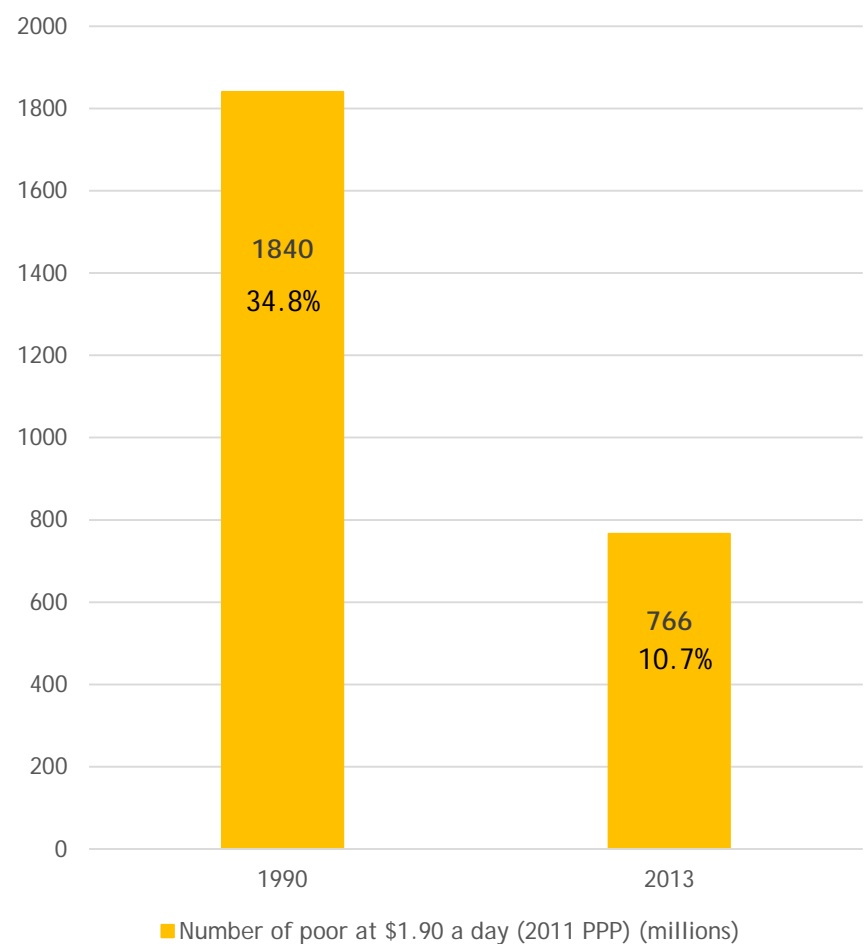
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Most Pressing Priorities in Developing World

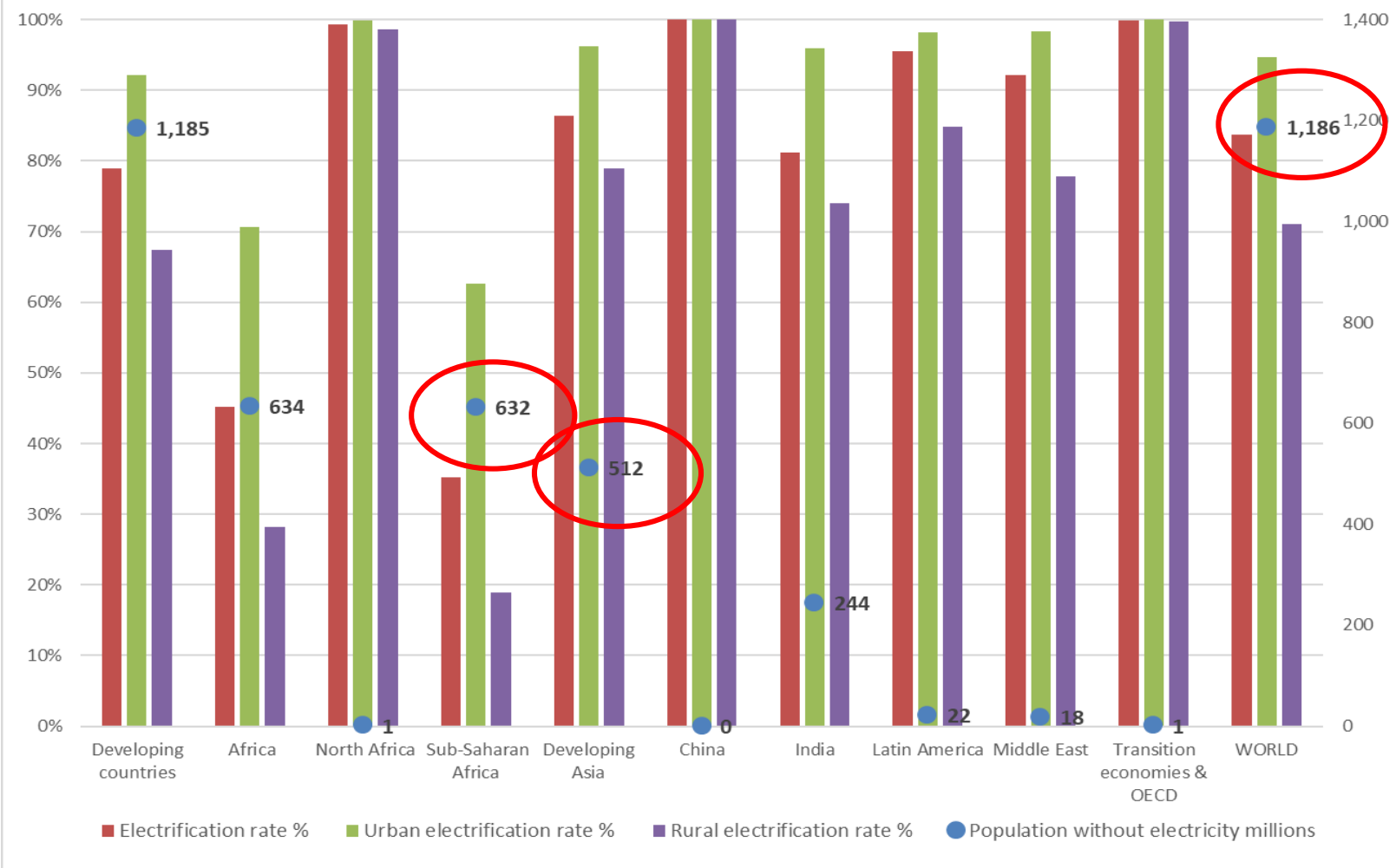
- ▶ Poverty and Energy Access
- ▶ Economic Development, job creation and expectations for rising salaries
- ▶ Improving living conditions, rise of the middle class and the demand for a safety nest
- ▶ Increase productivity: low income countries - low hanging fruit and middle income countries - high hanging fruit
- ▶ Increasing Environmental and Social Constraints

Poverty and energy access

Number of poor at \$1.90 a day
(2011 PPP and millions)



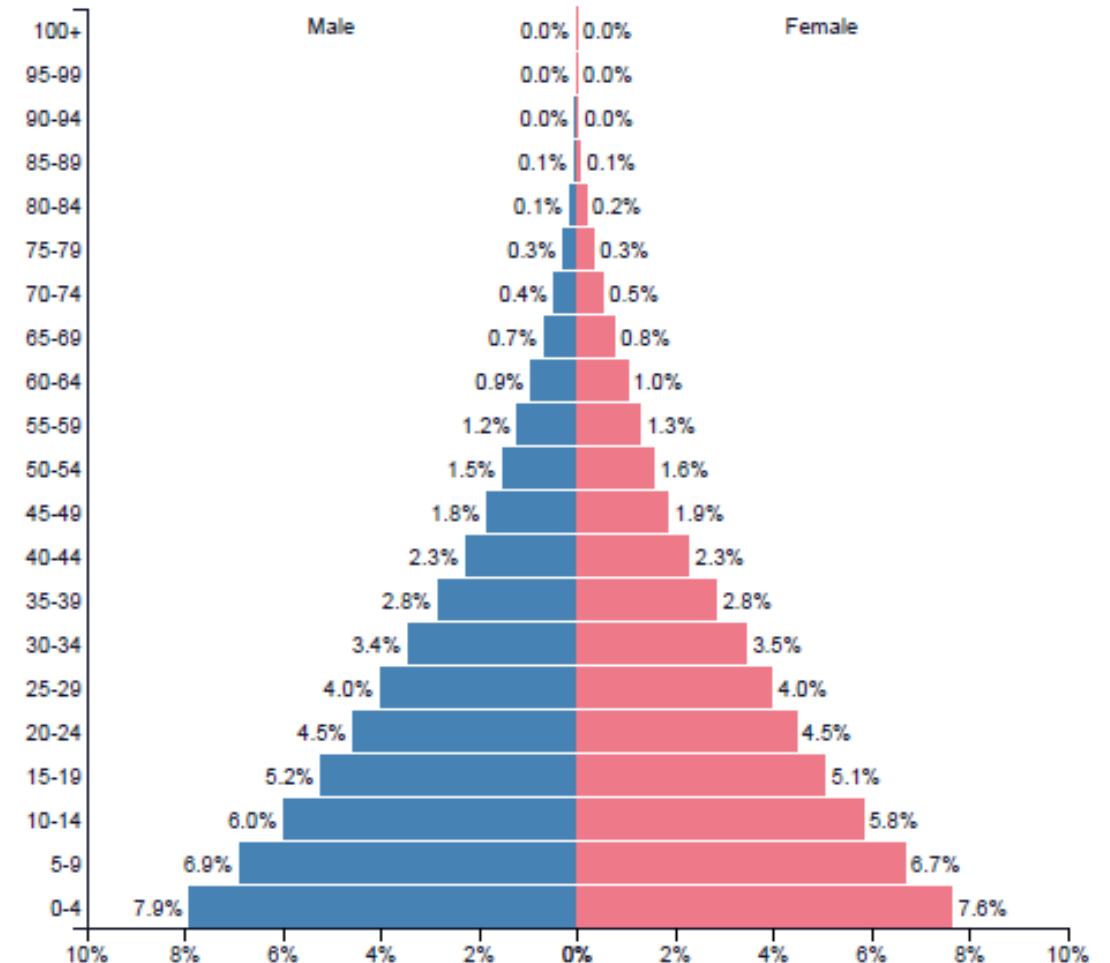
Electricity access in 2014 - Regional aggregates
SOURCE: IEA, World Energy Outlook 2016



Economic Development, job creation and expectations for rising salaries

- ▶ The world needs to wake up to “the ticking timebomb” of youth unemployment in developing countries and treat the issue as seriously as humanitarian disasters and global efforts to eradicate disease, a group of British MPs has warned.
- ▶ In its latest report, the Commons International Development Committee (IDC) says **population increases** - especially in Africa - are making it harder for people to earn a livelihood, let alone find full-time employment.
- ▶ With 600 million young people competing for a predicted 200 million jobs over the next decade, the committee says there is a danger of widespread social and political unrest.

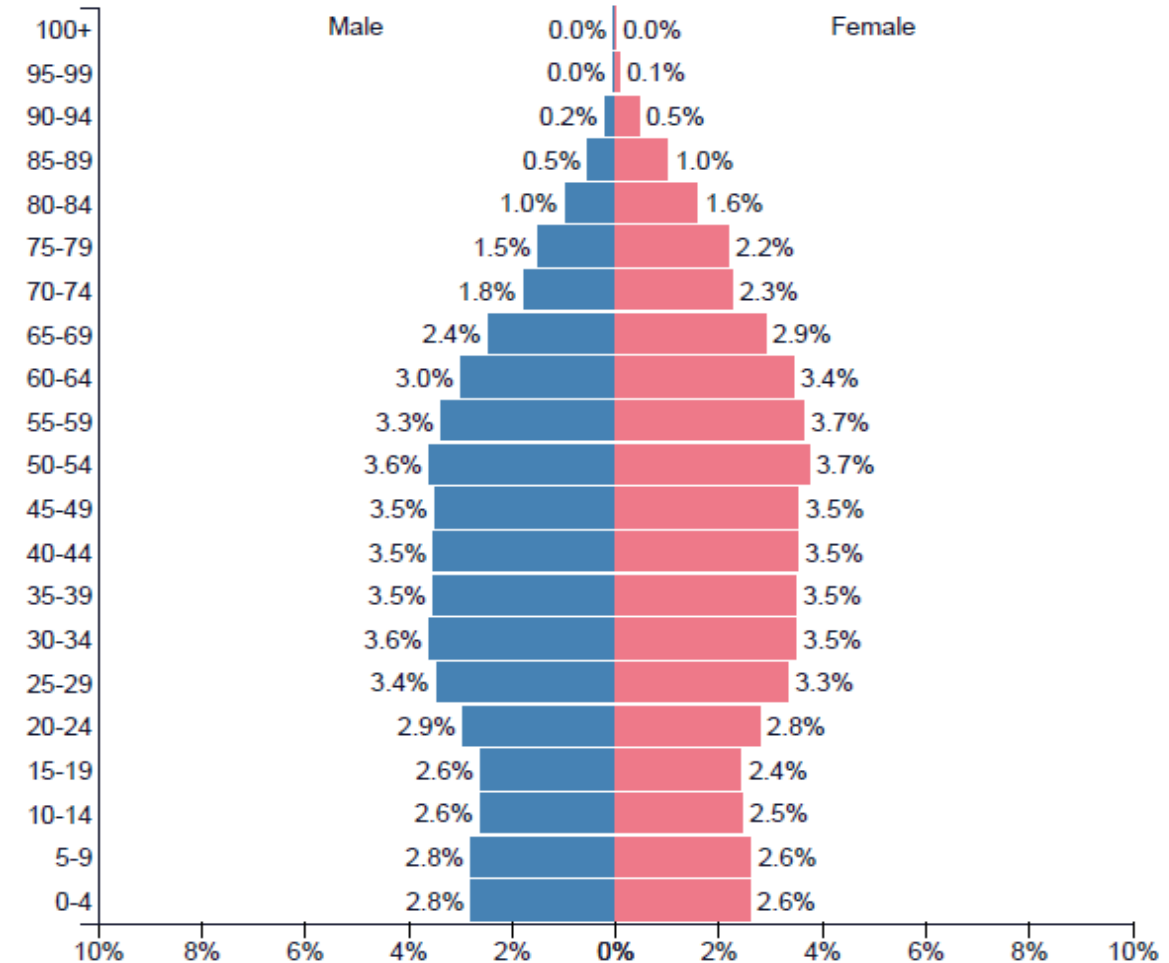
Africa Population 2016: 1.216 Billion UN



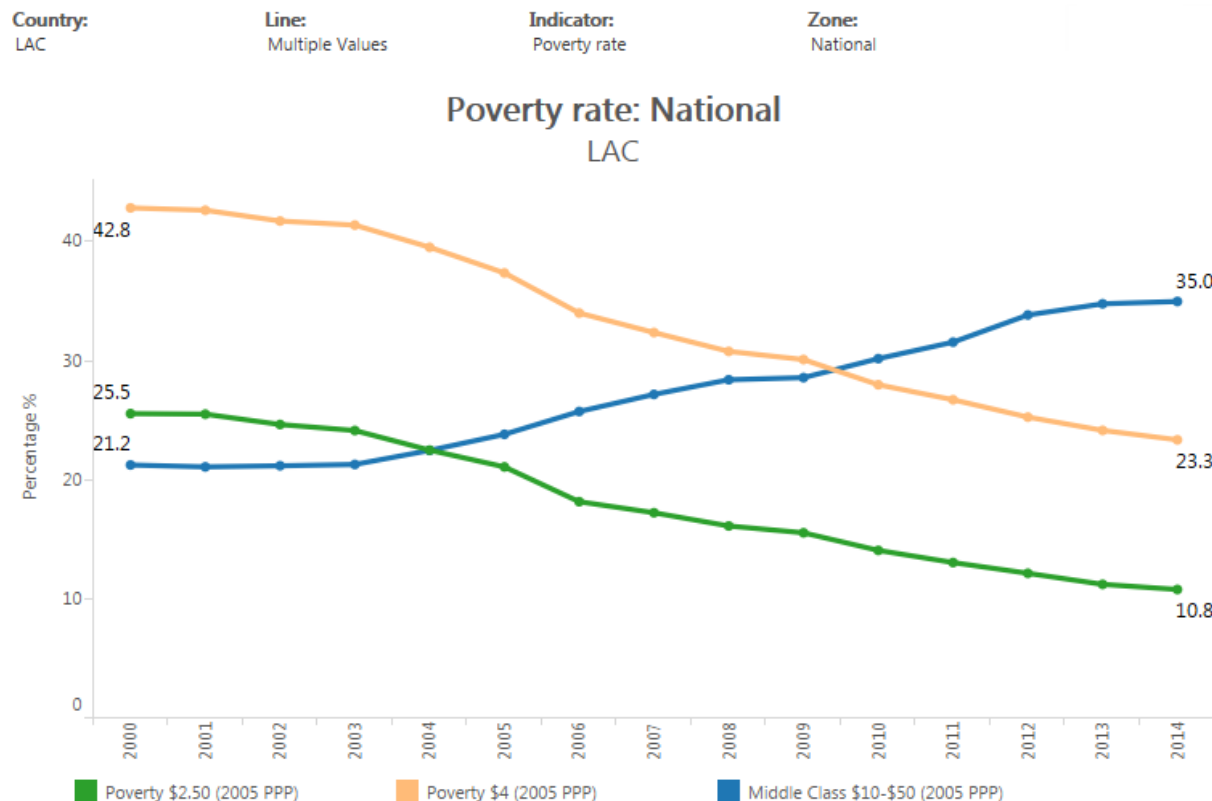
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Europe Population 2016: 739 Million UN

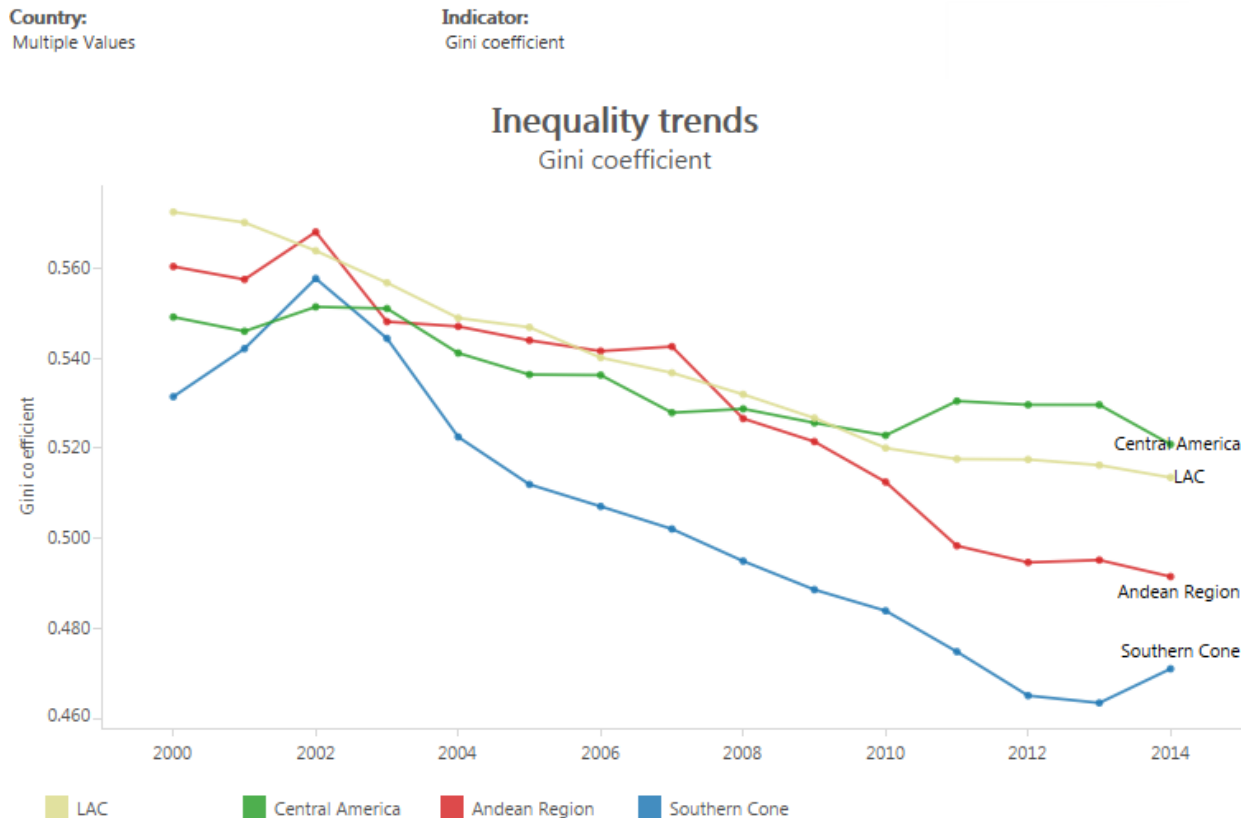


Improving living conditions, rise of the middle class and the demand for a safety nest



Source: LAC Equity Lab tabulations of SEDLAC (CEDLAS and the World Bank).

Note: Since the numbers presented here are based on SEDLAC, a regional data harmonization effort that increases cross-country comparability, they may differ from official statistics reported by governments and national statistical offices. In cases where data are unavailable for a given country in a given year, values have been interpolated using WDI data to calculate regional measures. The number of poor is based on total population from WDI. The LAC aggregate is based on 17 countries in the region for which microdata are available at national level. Urban and rural poverty rates are not available for the LAC aggregate or subregions. Updated April 2016



Source: LAC Equity Lab tabulations of SEDLAC (CEDLAS and the World Bank) and World Development Indicators (WDI).

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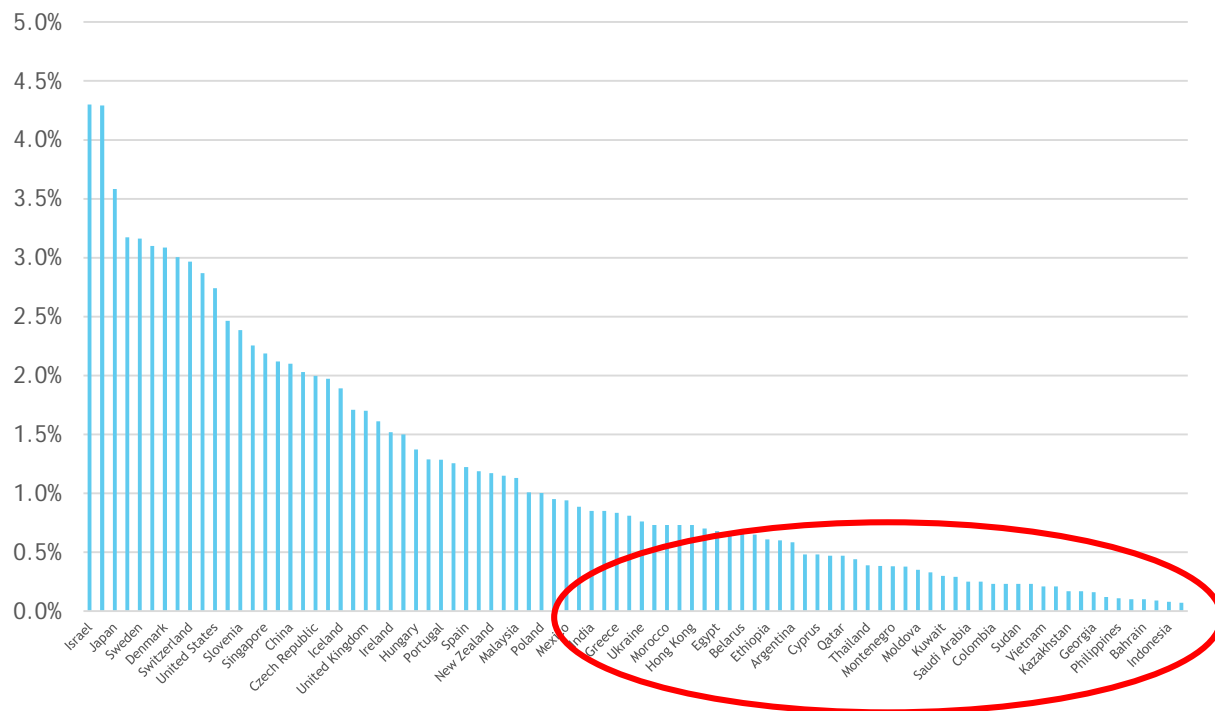
Increase productivity: low income countries - low hanging fruit and middle income countries - high hanging fruit

On the dynamics of economic growth: Malthus, Solow and Romer

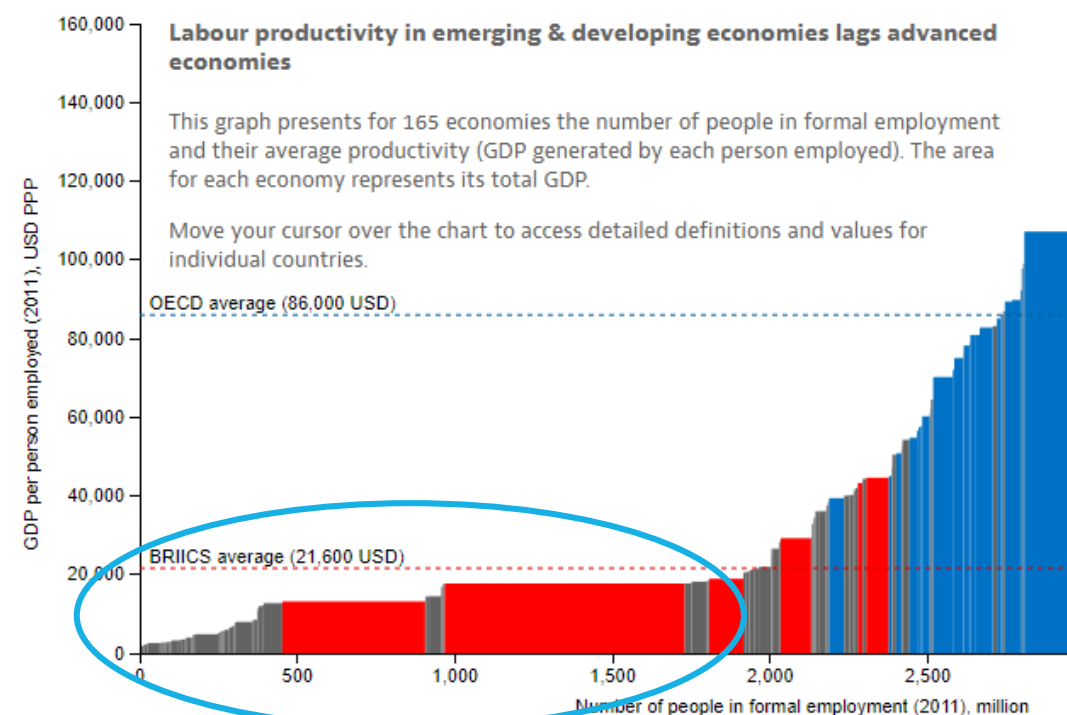
Boosting productivity key for developing economies to close income gap with advanced countries

With few exceptions, hard to expect contributions in frontier edge innovation and technology

Expenditure in R&D as % GDP
(> 100 US\$)



Labour productivity



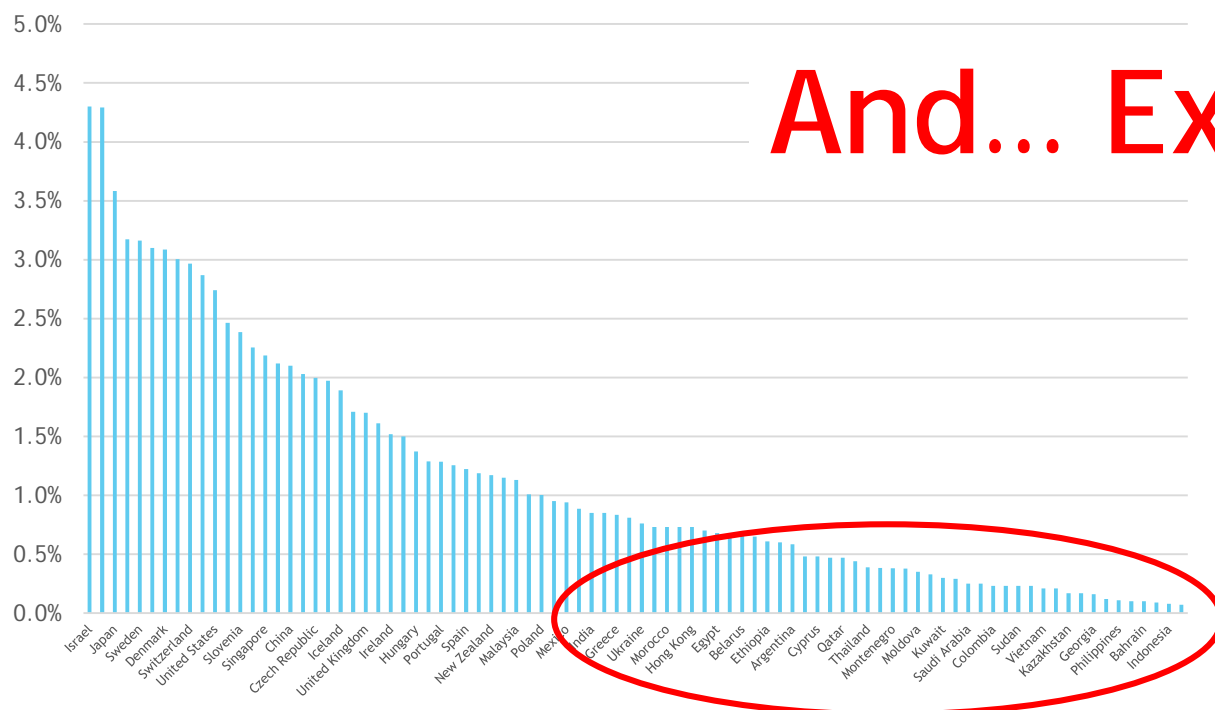
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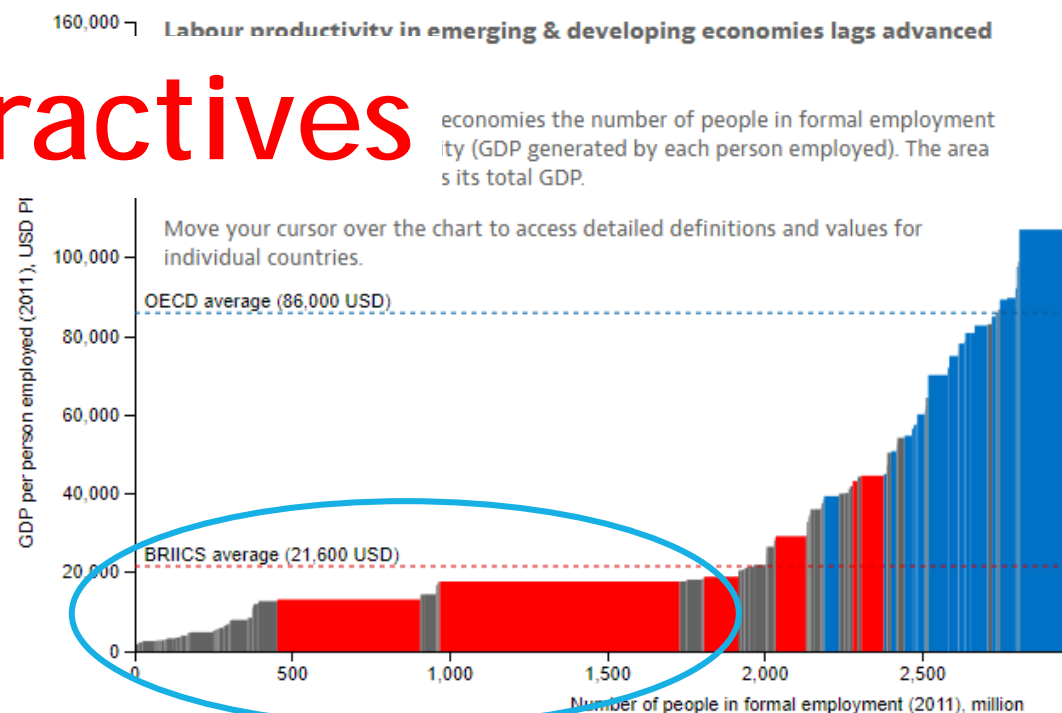
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And... Extractives

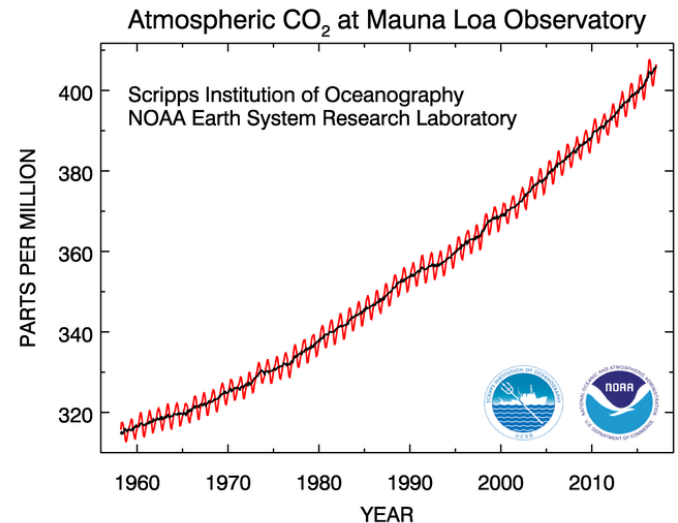
Labour productivity



Increasing Environmental and Social Constraints

Change in the Civil Society and Change in Power

- We are more
 - More educated
 - And more empowered
-
- **NIMBY** – Not In My Back Yard.
 - **LULU** – Locally Unwanted Land Use.
 - **NOPE** – Not On Planet Earth (!).
 - **BANANA** – Build Absolutely Nothing Anywhere Near Anything.
 - **CAVE** – Citizens Against Virtually Everything



But, caring for the environment can be seen as a luxury public good

Key Challenges for Energy Sector

- ▶ **Growth in energy demand:** pop. growth and econ. development
- ▶ **Affordability**
- ▶ **Enabling institutional and business environment**
 - ▶ Informal economy
 - ▶ Red tape and corruption
 - ▶ Access to finance
 - ▶ Lack of infrastructure
 - ▶ Lack of qualified labor
 - ▶ Limited or no resources for innovation
 - ▶ Restricted access to R&D networks
 - ▶ Property rights
 - ▶ Political and cultural constraints
- ▶ **Social and environmental licenses and climate change**

Opportunity

- ▶ Easy/more democratic access to technology, lower costs
- ▶ Softer lock-in, path dependency, with greater flexibility to build sustainable infrastructure, energy systems
- ▶ Large potential of untapped energy resources and EE
- ▶ Emerging economies are escalating in global rankings...
- ▶ As the developing world and large energy consumers and polluters commits with sustainable development, the Paris Agreement opens the chance to build sustainable energy systems and a global market for CO₂ emissions

Which policies do we need now?

- ▶ **Enabling business environment**
 - ▶ Rule of law, strong institutions and absence of corruption
 - ▶ Well functioning energy markets where private sector is key
 - ▶ International community/organizations (SE4ALL) is Key
- ▶ **Energy Access**
 - ▶ Affordability
 - ▶ Adequacy of infrastructure
 - ▶ Sustainability and EE
- ▶ **Innovation and technology transfer, enable new energy sources and access to additional resources**
- ▶ **A need for a clear leadership on where investments should go.**

Which Technologies do we need after 2030?

- ▶ **New technologies are reshaping the energy sector**, from a centralized structure to a decentralized one
- ▶ The advancement of drilling and other energy technologies has allowed the **access to new subsurface resources**, of non-conventional energy sources, and the harness of energy from the wind, sun, and oceans, among others.
- ▶ **New challenges** such as communications, smarter metering and the management of larger data, where demand side management and storage can become a key contributor for energy systems.

The way ahead

- ▶ Great **opportunity** in **developing world**
 - ▶ The need for **proper institutions** and an **enabling business environment**
 - ▶ **Access and energy for development should be the focus for energy policy**
 - ▶ The **levels of commitment** of an economy to a **low carbon economy** need clarity and stable **long-lasting rules** from governments and international community.
- ▶ Governments, international community, industry, researchers have a key role in the understanding and promotion of the proper policies, technologies and business models to manage the most pressing issues of developing world.



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