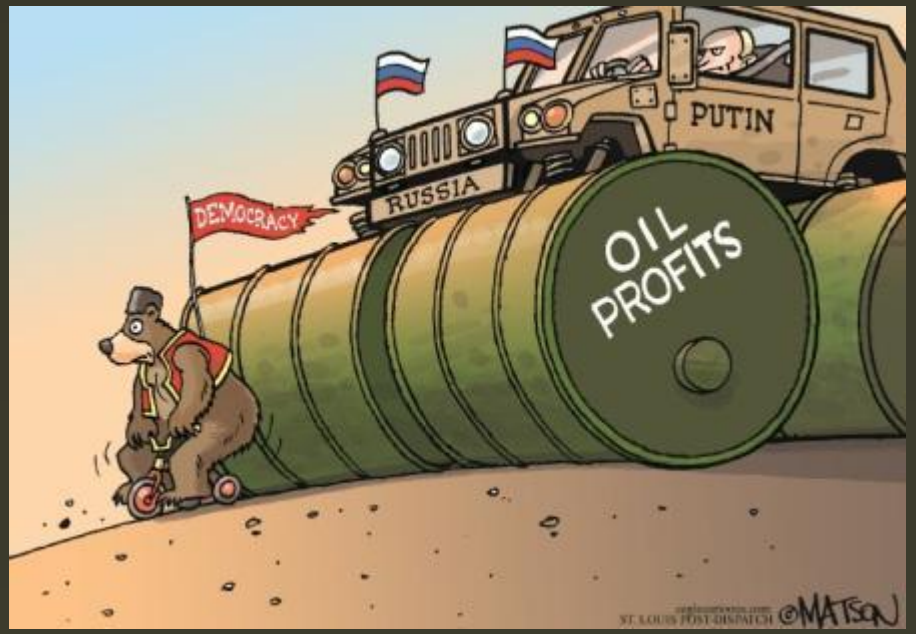


How Green is Green?

Bryony Walmsley, SAIEA

SAIEA

Aims of this presentation

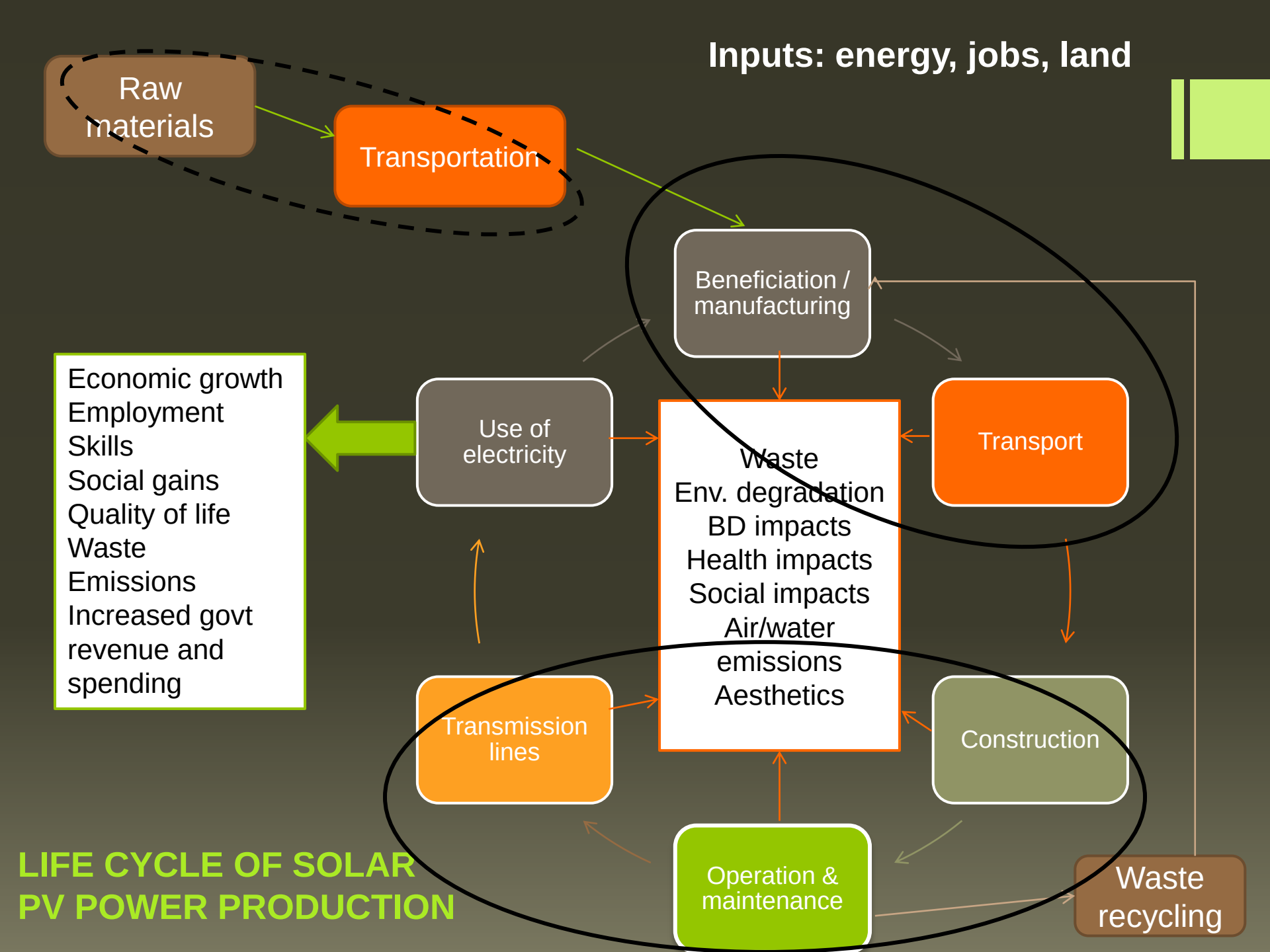
- It is NOT to take sides or support renewable vs non-renewable;
- It is NOT to provide an entire Life Cycle Analysis

- It aims to provoke discussion
- It aims to challenge conventional thinking
- It aims to address the conference theme: EIA – Evolution or Revolution

The Questions…

- Is it acceptable to think that all renewable energy projects are GOOD and all non-renewable projects are BAD?
- Do we really understand all the impacts and benefits associated with each type of energy source?
- Is ESIA an adequate tool to understand the complex life cycles of renewable and non-renewable energy?

Example 1: Solar energy: upstream environmental and social costs


Inputs: energy, jobs, land
Raw materials
Transportation
Beneficiation / manufacturing
Economic growth
Employment
Skills
Social gains
Quality of life
Waste
Emissions
Increased govt revenue and spending
Use of electricity
Waste
Env. degradation
BD impacts
Health impacts
Social impacts
Air/water emissions
Aesthetics
Transport
Transmission lines
Construction
Operation & maintenance
Waste recycling
LIFE CYCLE OF SOLAR PV POWER PRODUCTION

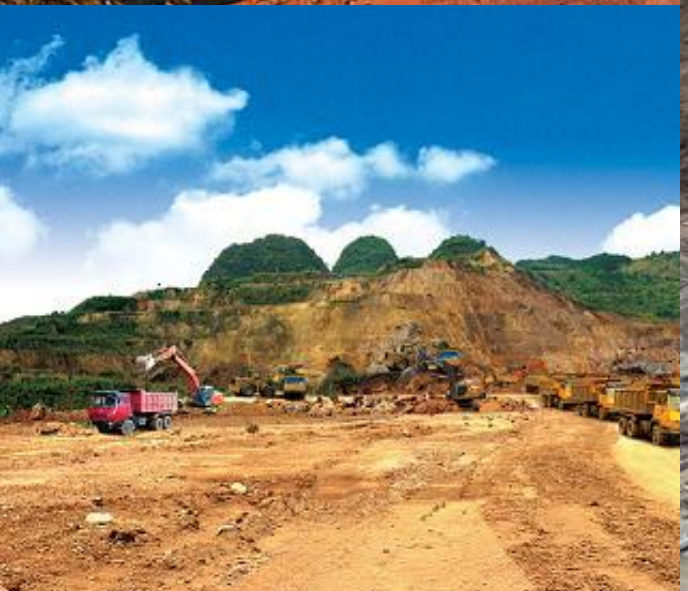
Life cycle analysis

- Most studies tend to focus on GHG savings, contribution to global warming, energy payback time (EPBT) and/or one type of PV panel
- Some environmental indicators are used e.g. Eco-Indicator99 – does this adequately account for loss of biodiversity, especially rare and endangered species and social costs?
- What about questions of aesthetics (intangibles e.g. visual impact, noise, loss of sense of place)?
- Most LCAs are from ‘in gate to out gate’, but:
  - What are the key assumptions about the mines, mining methods and practices of the raw materials? These are NOT renewable and many are scarce
  - What about the social, health, OHS and human rights issues associated with mining? These are NOT quantified
  - What about the downstream uses of electricity and the benefits this can bring? The LCAs tend to end at the ‘gate’ and not the ‘grave’

Minerals used in PV and battery production and their main sources

Minerals used in PV and storage batteries	Main global sources
Silicon	**China**, Russia, US, Norway
Bauxite for aluminium	Australia, China, Guinea, Brazil
Copper	**Chile**, Peru, China, US, Australia, DRC
Lithium	**Australia, Chile**, Argentina
Iron	**Australia**, Brazil, China, India
Phosphate	**China**, US, Morocco, Russia
Nickel	Indonesia, Philippines, Canada, Russia
Manganese	**South Africa**, China, Australia, Gabon
Cd, In, Ga (by-prod of Zn refining)	China, Japan, Korea
Tellurium (by-prod of Cu/Pb mines)	US, Russia, Japan, Canada
Molybdenum	US, Chile, Mexico, China, Canada
Zinc	**China**, Peru, Australia
Cobalt	**DRC**, China, Russia
Tin	**China**, Indonesia, Peru

Institute for Sustainable Futures Report: Going 100% renewable power means a lot of dirty mining (17 April 2019)



Example 2: Natural gas – downstream socio-economic benefits

Gas resources

- In 2009, huge gas reserves were found in the Rovuma Basin offshore northern Mozambique (estimated at 2.8 – 3 trillion m^3)
- At peak production this could make Mozambique the 3rd largest exporter of LNG in the world

Socio-economic baseline

- Mozambique is in a chronic state of under-development:
  - 65% of population lives in extreme poverty
  - Most rural people lack access to clean water, sanitation and electricity
  - 3rd lowest education attainment in world
  - One of lowest life expectancies in world
  - High burden of communicable diseases e.g. HIV
  - High rates of malnutrition and childhood stunting
  - High population growth rates
  - High dependency on agriculture
- BUT, in spite of this, Mozambique has had a sustained average annual GDP growth of about 7%
  - Far higher than neighbouring countries
  - Estimated to persist at this level for 20-25 years

Short-term boom …and bust?

- Foreign Direct Investment (FDI) increased by 58% in the 2 years following the gas discovery in 2009
- It attracted $9 billion FDI in 2014 alone
- 84% (~1 million) of the new jobs created by FDI in the period 2009-14 were attributed to the discovery of gas
- One new FDI job creates an extra 6 in the same sector in the same district e.g. in catering, driving, cleaning, legal and engineering services, retail, etc.
- About half of the new jobs were in the informal sector and 65% were taken by women
- Most FDI-related jobs tend to pay higher salaries and are more secure

Socio-economic growth

- FDI has led to:
  - Investment in many different sectors (existing)
  - Diversification of the economy into new sectors
  - Skills development
  - Opportunities for growth

- BUT, the scale of sustainable economic growth and diversification depends on:
  - Government stability;
  - Governance;
  - Investment policies;
  - Other market forces

Long-term potential (by 2040)

- Rapid growth and a shift to an *energy-intensive* economy based on gas will not transform the country overnight – this requires careful management and investment of gas revenues (*money*) into key national social development sectors:
  - Improving family planning
    - 9% reduction in extreme poverty
    - 2.5% increase in GDP
  - Improving health care and reducing the disease burden
  - Improving sanitation and access to clean water
  - Improving access to electricity
  - Advancing education
  - Boosting agricultural production
    - 13% reduction in extreme poverty
    - 4% increase in GDP
  - Strengthening governance
    - 8% reduction in extreme poverty
    - 8% increase in GDP

Conclusions

- We cannot take a binary (good/bad) view of energy developments due to the complexity of the issues
- Neither ESIA nor traditional LCA adequately address the entire scope of positive and negative impacts from cradle to grave – *do we need to revolutionise our approach?*
- Greater use of SEA is required to scrutinise national energy policies to ensure the full benefits of energy (from whatever source) and to minimise the unintended consequences of rapacious development
- There are significant shifts in the energy supply paradigm which will need us to focus on:
  - More responsible procurement
  - Improved governance at all levels of the supply chain
  - Improved governance to ensure that energy revenues contribute to the development of sustainable economies
  - More inclusive environmental assessments

Thank you!

I acknowledge the following sources:

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- Google images on slides 1, 4, 8, 9, 10