Trends and Considerations of Renewable Energy Development

A Regional Perspective

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Renewable Energy Trends

- Renewables are increasingly displacing conventional fossil fuels in: electricity generation; heating and cooling of air and water; transport; and rural (off-grid) energy services.

- Global new investment in renewable power and fuels (not including hydropower projects larger than 50 MW) was USD 241.6 billion in 2016.

- The renewable energy sector employed 9.8 million people in 2016.
Political momentum for RE

- As of 2016, nearly all countries supported renewable energy development and deployment

- At COP22 leaders of 48 developing countries committed to work towards achieving 100% renewable energy

- 117 countries submitted their first Nationally Determined Contributions (NDCs) under the Paris Agreement, of which 55 featured RE
Role of Local Governments in RE transition

Municipal policy makers play a key role in promoting the use of renewable energy

- Local and regional governments closer to citizens
- More flexibility than national governments in making energy planning decisions
- Social acceptance easier on smaller scale
- Authority over transportation, land-use planning, building codes, etc.
Number of cities committed to transitioning to 100% renewable energy continued to grow
• Some cities and communities already reached this goal (Japan, U.S.)

• Many jurisdictions benefit from policies promoting use of solar hot water systems in residential and commercial buildings

• Under the Covenant of Mayors for Climate & Energy, over 7,200 communities committed to reducing emissions 40% by 2030, by increasing energy efficiency and renewable energy deployment
LCA of RE Technologies

- LCA can help local authorities identify possible adverse impacts of a particular technology.

- Environmental impacts of RE mainly from manufacturing, installation, and disposal of the power conversion devices (e.g. wind turbines or solar panels).
LCA of RE Technologies compared to fossil fuel alternatives

- RE reduces substantially impacts on the environment and human health, with the exception of material use
Ecosystems
• Issue of bird collisions with spinning turbine blades
• Better tower designs, lower turbine speeds, and more attention to siting reduced bird mortality

Land use
• Land available for other uses such as farming

Social
• Sound and visual impairment
• Mitigation measures

Environmental
• Emissions from transport, construction, disposal negligible
LCA of RE Technologies: Solar

Land use
• Trade-off between agricultural use and large scale solar projects

Water
• Used in cleaning mirrors of CSP plants and PV panels

Metal depletion
• PV require greater amount of metal than conventional sources

Hazardous materials
• Manufacturing process uses hazardous materials
• Toxic emissions from PV solar cells and CSP mirrors
• Important to consider end of life issues
LCA of RE Technologies: Biomass

Land use
• Impacts depend on the feedstock (if agricultural residues, no increase in land use)

Water
• Required for cooling (same as coal power plants) and to produce the feedstock
• When feedstock is waste, no additional water needed

Environment / Air quality
• Impacts depend on the feedstock, combustion technology, pollution control technology
• If feedstock produced in a sustainable manner net GHG emissions close to zero
LCA of RE Technologies: Geothermal

Environment

• Impacts from emissions at the site, rather than from manufacturing process of plant components or drilling activities
• Fugitive GHGs via steam release critical

Water

• Possible impacts on water quality and consumption

Land use

• The amount of land required depends on a number of factors (properties of the resource reservoir, the amount of power capacity, the type of energy conversion system, the type of cooling system, etc.)
The electricity mix of Mauritius (population 1.3 million) is predominantly fossil fuel based.

- 80% coal and oil
- 20% from renewable sources such as bagasse (derived from sugarcane) and hydropower
- An LCA determined the respective environmental impacts of these sources of electricity
- Coal and oil scored higher on nearly all effect categories than the two renewable sources
Case Study: Australia

LCSA conducted on a specific case called UQ Solar in Queensland State (‘sunshine state’)

- PV manufacturers to reduce toxic/hazardous materials used in PV modules production
- End-of-life treatment should be taken care of to make sure solar modules/components/materials can be reused/recycled/recovered
- Government should provide more incentives/funds/infrastructures and reduce subsidies for fossil fuels
- More awareness activities to promote the social acceptance of solar PV installations
Find more about UN Environment’s Life Cycle Initiative: lifecycleinitiative.org
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