



# Accounts for renewable energy assets

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13<sup>th</sup> Meeting of the Advisory Expert Group on  
National Accounts, 1-3 October 2019

# Renewable energy assets: scope and motivation

World Bank: comprehensive wealth accounts for 140+ countries;

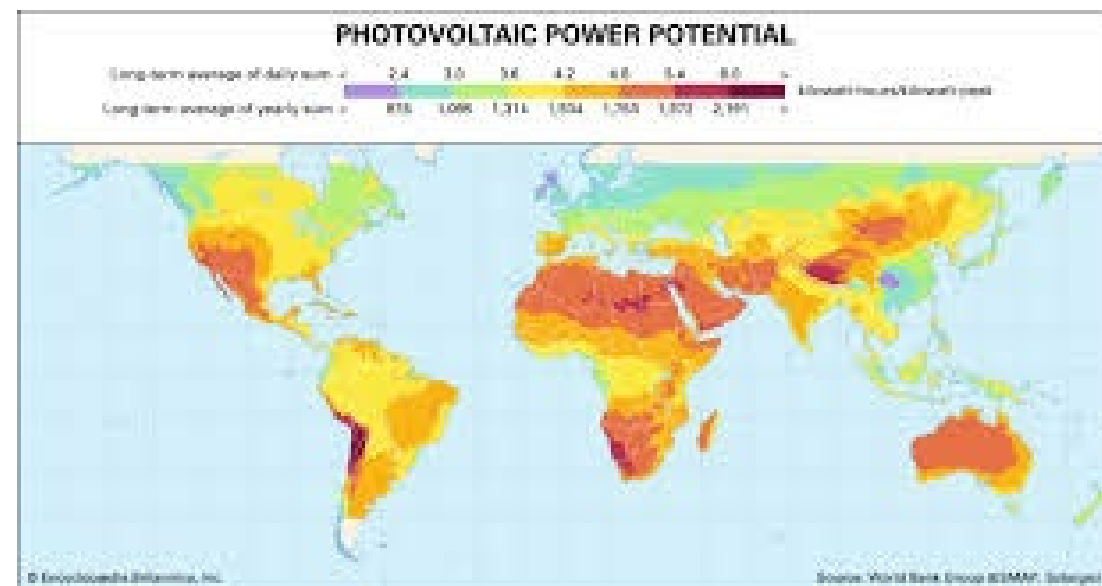
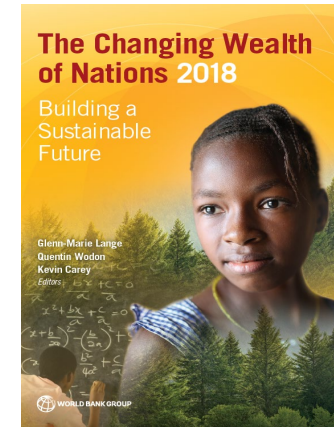
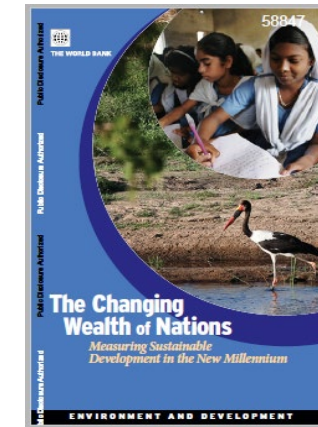
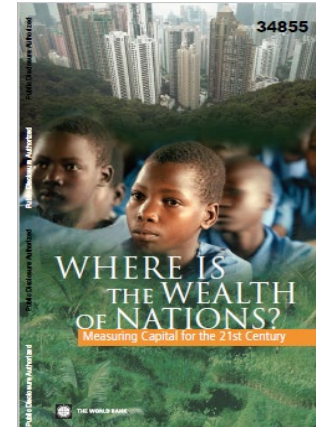
Next update: *“The Changing Wealth of Nations 2020: From Accounting to Managing Assets”*

Renewable energy—hydro, wind, solar, geothermal resources— **too important** to omit from national balance sheets

- Fastest growing sector of electricity sector
- Already accounts for >20% of global capacity (IEA)

CWON 2020 would like to include renewable energy assets:

- hydro, geothermal, wind and solar



# Treatment of renewable energy assets in SNA and SEEA-CF

**SNA** does not address renewable energy assets (implies they are not assets because ownership rights cannot be enforced)

**SEEA-Central Framework (CF):**  
renewable energy is an **attribute of land**, not a distinct asset, and its asset value is captured in the value of land

Specialized SEEA manuals, **SEEA Energy**, **SEEA Experimental Ecosystem Accounting** do not address asset value



# Problems with SEEA-CF approach to renewable energy assets

SEEA-CF treats renewable energy resources as an attribute of land, but,

- Some renewables are not associated with land—offshore wind, solar, ocean resources
- Often associated w/ land that has no economic value and does not appear in SEEA-CF or SNA (hydro, large-scale solar/wind)
  - Not clear why the value of solar/wind farms on zero-value land should be attributed to land rather than to the resource itself
- Geothermal: ownership rights may be separated from land rights
- Not consistent with treatment of some other natural resources, e.g., standing timber valued separately from the land on which it is grown



# Closer look at natural resource assets in SNA and SEEA-CF

Natural resources have evolved to meet both SNA and SEEA-CF asset definition: ownership rights, generation of economic benefits (SEEA-CF does not require economic benefits)

Natural resources currently recognized as asset by SNA:

- Land (including associated soil, surface water)
- Mineral & energy resources
- Biological resources that grow naturally
- Surface and groundwater
- Electromagnetic (radio) spectrum

SEEA-CF separates land into soil and 'space'; does not recognize the radio spectrum ("not part of biophysical environment")

# Radio spectrum in the SNA as a model for treating renewable energy assets?

It can be difficult to conceptualize exactly what the renewable energy asset is, hence, hence treating it as an attribute of land.

Inclusion of radio spectrum in SNA is quite recent, coinciding with the rise of cell phone industry,

Billions of \$ of public revenues generated from auction of radio spectrum

Ownership:

- Spectrum is owned—govt awards licenses
- Spectrum is rival—users can disrupt/degrade others' signals, but cannot physically prevent use

Economic benefit: used by telecomms industry as a natural resource asset

Renewable energy assets generate economic benefits and are under ownership/control

# Proposed approach to renewable energy resources as assets

*Table 1 - Suggested additions to SNA and SEEA-CF natural resource asset classifications*

<b>SNA</b>	<b>SEEA-CF</b>
<i>Land</i>	<i>Mineral and energy resources</i>
<i>Mineral and energy reserves</i>	<i>Land</i>
<i>Renewable energy resources</i>	<i>Soil resources</i>
<i>Non-cultivated biological resources</i>	<i>Renewable energy resources</i>
<i>Water resources</i>	<i>Timber resources</i>
<i>Other natural resources</i> - <i>Radio spectra</i> - <i>Other</i>	<i>Aquatic resources</i>
	<i>Other biological resources</i>
	<i>Water resources</i>

**Note:** Suggested additions shown in green.

Important to avoid any potential double-counting where land value may include value of renewable energy resources.

# Approaches to valuation of renewable energy assets

**Least-cost alternative:** estimate the rent that would be generated by the least-cost alternative source of energy

Very complex to implement (see Canadian examples)

**Residual value:** assumes markets approximate long-run equilibrium so that the residual value method accurately measures rents

Consistent with widely applied approach to natural resource rents in both SNA and SEEA-CF where markets for assets are lacking

Challenges when applied to renewable energy resources:

Adjusting for market distortions that arise from, for example,

- Heavy subsidization of energy production & consumption
- Uncertainty about legal, regulatory environment

Costs of intermittency/grid integration costs

**Proposal: use residual value approach**