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Ministry of Infrastructure  
**The Republic of Rwanda**

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**Towards universal energy access by 2020 in  
Rwanda**

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## | *Contents*

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- 1. Key Messages**
- 2. Country Unique Propositions**
- 3. Energy Sector Status**
- 4. Electricity Access**
- 5. Generation and Grid Reliability**
- 6. Towards a renewable energy future in Rwanda**
- 7. Nexus Targets**

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## 2013-2020 | *Key Messages*

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- ▶ 2013-2016      Great progress made across a number of areas in recent years
  - ▶ An attractive investment climate established and a pipeline of projects developed
  - ▶ Local resources leveraged, including innovative use of methane gas
  - ▶ The grid reinforced and expanded
  - ▶ Dedicated electricity utility established (Rwanda Energy Group)
  - ▶ High urban access achieved and off-grid initiatives being implemented
  - ▶ New tariff in place from January 2017 offering lifeline for lowest-income households and reduced costs for industry
- ▶ 2017-2020+      Robust resilient sector
  - ▶ Updated Least Cost Power Development Plan towards delivery of Sector Targets

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# Rwanda | *Unique Propositions*

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**Risk Mitigation** | *Bilateral Investment Treaty with the United States*

**Rwanda Development Board** | *Open 24 Hours*

**S & P Country Credit Rating** | *B with a Stable Outlook*

**Fitch Competitiveness Rating** | *B+ with a Stable Outlook*

**Best Global Reformer Since 2005** | *World Bank Doing Business 2014*

**2nd in the world in credit financing and 4th globally on registration of property** | *World Bank Doing Business 2017*

**Positioned 56 out of 190 Countries** | *World Bank Doing Business 2017*

**Guiding Planning Documents** | *EDPRS II, 7 years Government Program, Millennium Targets*

**Cabinet Performance Contracts** | *Imihigo*

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# Energy Sector Status

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## Progress and Key statistics

- **Increase in electricity connections:** From 6% in 2008 to 35.3 % May,2017
- **Steady increase in generation:** 208MW (Current)
- **Electricity Generation:** 49% Hydro, 26% Thermal, 14% Methane, 7% Peat, 4% Solar PV
- **Regional generation:** Hydro power, geothermal exploration
- **Regional interconnections:** Developing Burundi-DRC-Uganda-Kenya-Ethiopia Transmission lines
- **Biomass consumption:** Reduced from 99% population in 2000 to 85 % in 2014
- **Schools and health clinics with electricity access:** 64% and 100%
- **Average tariffs (Life Line Tariff):** \$0.12c/kWh for industries and \$0.17c/kWh for other consumers

## Targets to be met by 2018

- Electricity Access: **70% households**
- Grid capacity (domestic + imports): **563MW**
- Regional Connections: **Uganda and Kenya 2016, Ethiopia 2017**
- Biomass consumption: **85% to 55%**
- Schools and health centres: **100%**

## Investment Facilitation

- Power Purchase Agreements (**PPAs**): 25 years as minimum
- Independent Power Purchase Agreements (**IPPs**) as standard
- Public Private Partnership (**PPPs**) experience: Draft PPP Law and Policy
- Renewable Energy Fund (**REF**) to support Off Grid Technologies development
- Long use of Engineering, Procurement and Construction (**EPC**)

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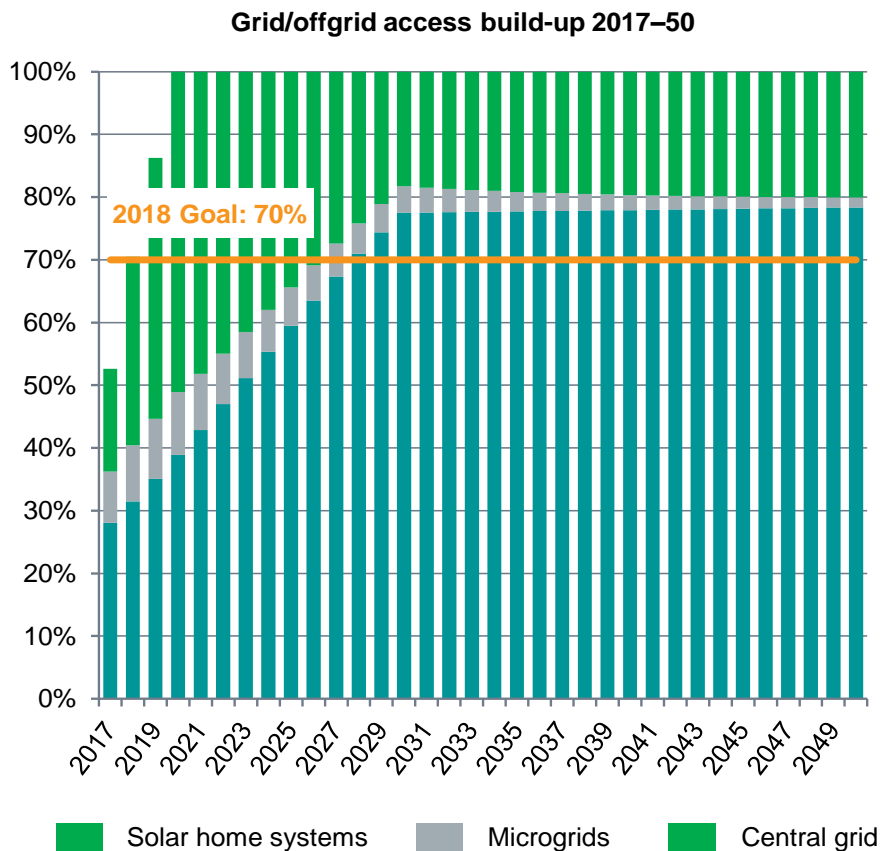
## Access Status

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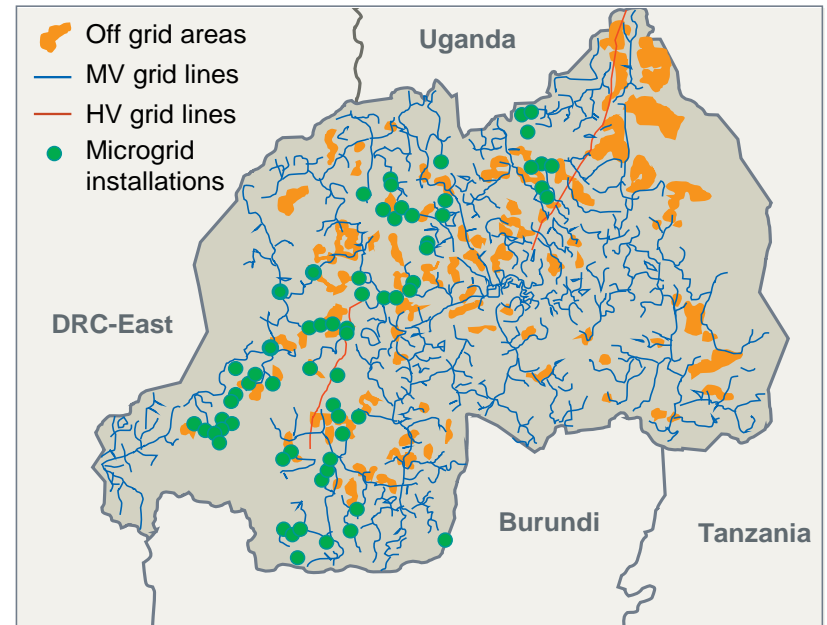
- Access to electricity by households increased **3 times** from **9%** in 2010 to **35.3%** in May 2017 (On-grid 28% and 7.3% off-grid);
- 92% of Sector Offices connected to electricity grid and expected to increase to 98% by June 2018;
- 85% Health Centers connected to electricity;
- 54% of all schools connected to electricity.

# Access Targets-Grid and Off Grid areas

## Envisaged capacity growth to meet access targets in the High Case scenario



## Current microgrid installations and designated offgrid areas



Note: map not to scale, locations approximate.

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## Generation and Grid Reliability

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- Power generation capacity tripled from 2010 to Jan. 2017
- No load shedding from December 2015 (current power cuts are related to network issues);
- The rate of major power cuts has decreased from **62 minutes/month** in January 2016 to **10 minutes/month** in December 2016;
- Industrial tariffs decreased between 30% and 32%;
- Electricity tariffs for low income households decreased by **51%**;



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# Towards a renewable energy future in Rwanda

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## Rwanda's Vision 2020

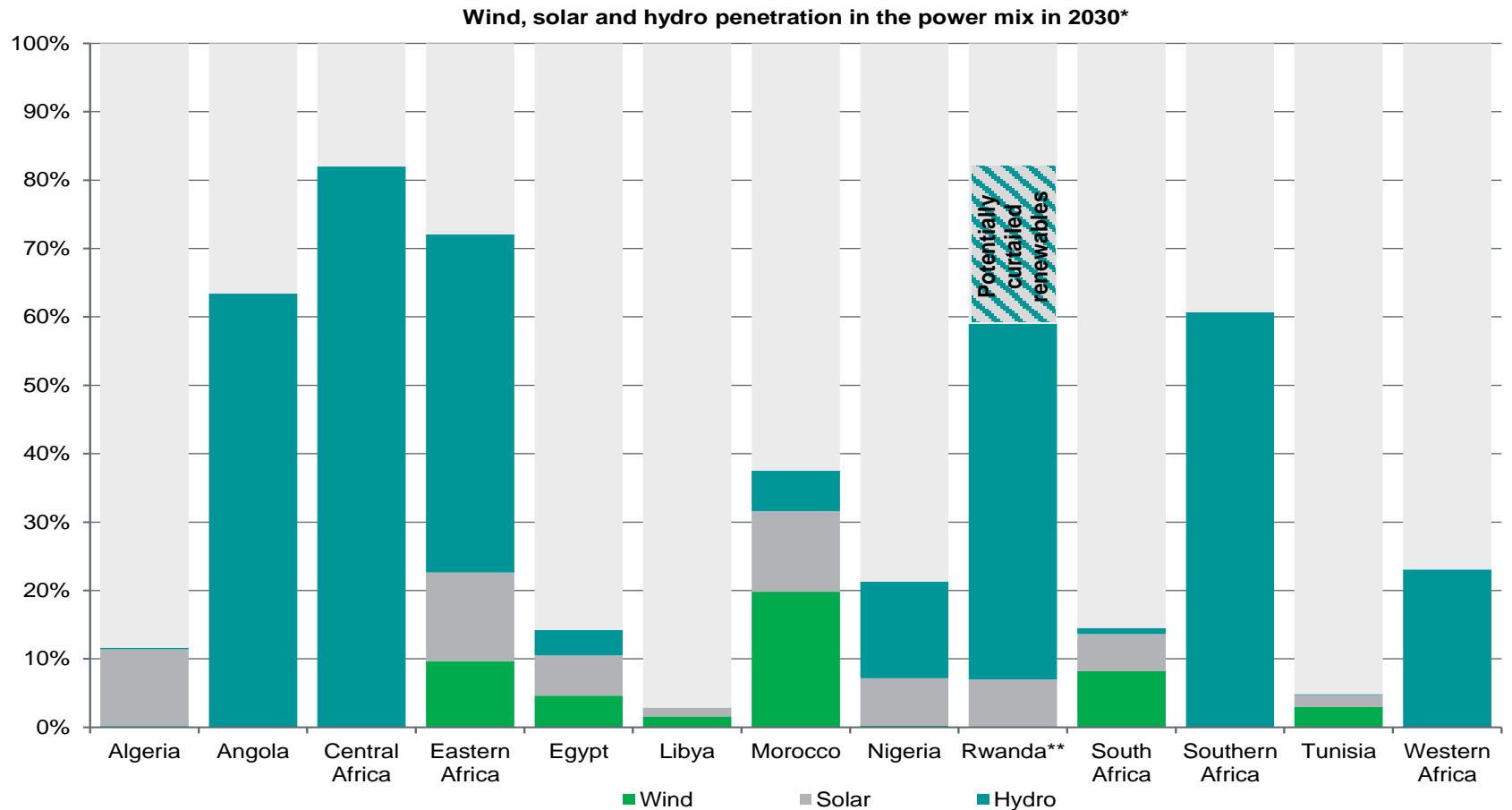
- Ensure universal **access** to modern energy services
- Double the global rate of improvement in **energy efficiency**
- Double the share of **renewable energy** in the global energy mix

# Targets towards a renewable energy future in Rwanda

Sector	Target
<b>Access to clean and sustainable cooking</b>	<ol style="list-style-type: none"> <li>1. Close the gap (currently about 20%) between production and consumption of biomass to make it a sustainable source of energy</li> <li>2. Supply a growing and urbanising population with clean secure supplies of biomass for cooking, requiring:               <ol style="list-style-type: none"> <li>a. 100% access to much more efficient cookstoves than currently used</li> <li>b. Reduction in losses from charcoal by improving charcoal production and promoting alternatives such as biomass pellets, biogas and LPG</li> <li>c. Increasing production by improving forestry management</li> </ol> </li> <li>3. To ensure that the efficient cookstove solutions address health issues by significantly reducing indoor air pollution</li> </ol>
<b>Access to electricity</b>	<ol style="list-style-type: none"> <li>1. Achieve 100% electricity access: By 2020, all households will have at least basic levels of access (Tier 1 and above), and by 2030, all households will have moderate access to electricity services (Tier 2 and above).</li> <li>2. Progress to higher quality and quantity of electricity over time, with &gt;70% of the population having Tier 3-5 access by 2030.</li> </ol>
<b>Renewables</b>	<ol style="list-style-type: none"> <li>1. Exceed the global SE4All target (26%) of renewable energy as a percentage of the primary energy supply</li> <li>2. Exceed the global SE4All target (60%) of renewable electricity generation as a percentage of total electricity generation</li> </ol>
<b>Energy efficiency</b>	<ol style="list-style-type: none"> <li>1. At least double the efficiency of biomass energy use</li> <li>2. Extend current rates of electrical efficiency improvement to 2030</li> </ol>

# Renewable energy future in Rwanda

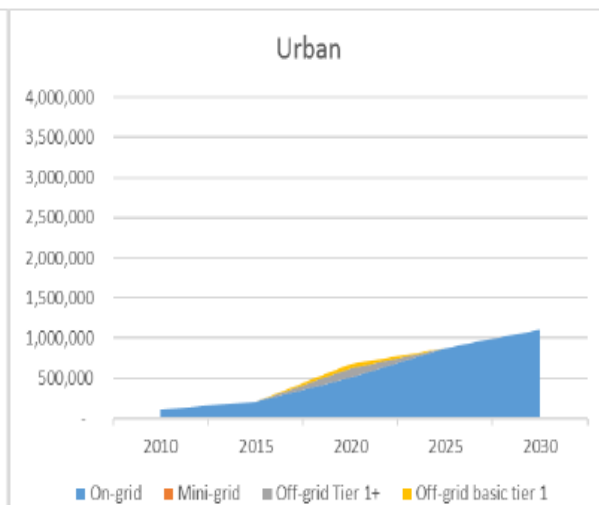
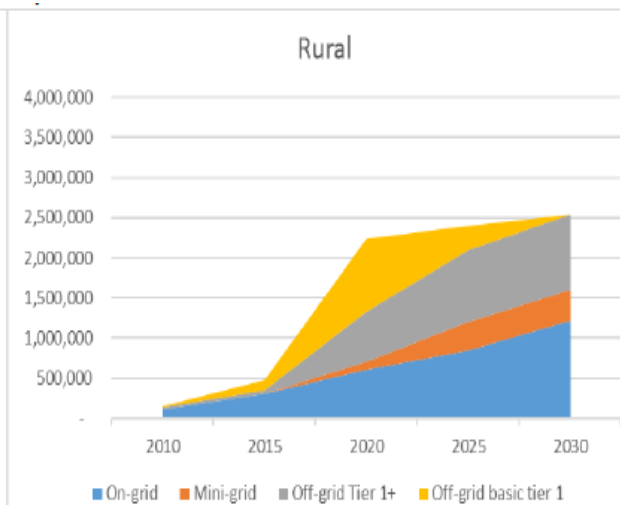
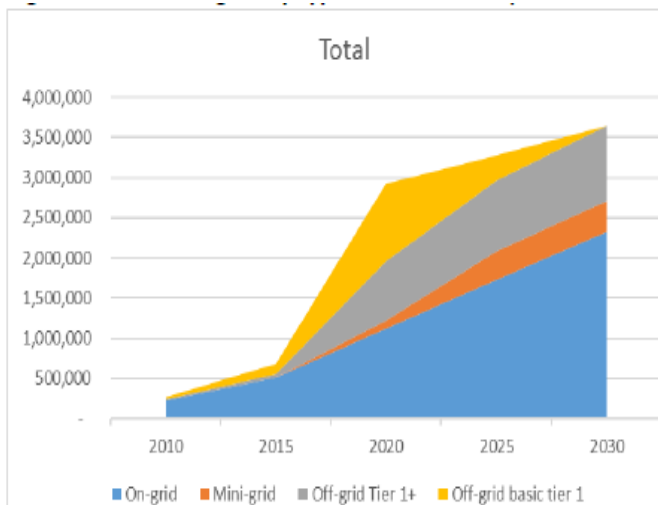
Rwanda renewables penetration versus other African countries



Note: \*IHS Markit projections. Other sources include other nonhydro renewables, nuclear, coal, gas, and oil. Hydro includes large hydropower plants. \*\*Base case.  
Source: IHS Markit

# Pathways to electricity access in Rwanda

		Rwanda Average				Rural				Urban			
		2015	2018	2020	2030	2015	2018	2020	2030	2015	2018	2020	2030
# Households	Basic Tier 1	126,826	370,000	979,289	-	125,130	292,213	908,940	-	-	77,787	58,921	-
	Tier 1+	42,275	521,086	492,378	-	41,710	424,000	421,585	-	-	96,174	67,640	-
	Tier 2	-	130,271	246,189	957,653	-	106,000	210,793	937,936	-	24,043	33,820	-
	Tier 3-5	511,367	873,217			312,824	513,970	706,385		205,731	372,101	516,016	
	<b>Total</b>	<b>680,468</b>		<b>1,206,242</b>	<b>2,688,075</b>	<b>479,664</b>		<b>1,606,875</b>		<b>205,731</b>	<b>570,105</b>	<b>676,396</b>	<b>1,100,917</b>
			<b>1,894,574</b>	<b>2,924,099</b>	<b>3,645,728</b>		<b>1,336,182</b>	<b>2,247,703</b>	<b>2,544,811</b>				<b>1,100,917</b>
Percentage	Basic Tier 1	5%	14%	33%	0%	6%	14%	40%	0%	0%	14%	9%	0%
	Tier 1+	2%	19%	17%	0%	2%	20%	19%	0%	0%	17%	10%	0%
	Tier 2	0%	5%	8%	26%	0%	5%	9%	37%	0%	4%	5%	0%
	Tier 3-5	20%	32%	41%	74%	15%	24%	31%	63%	40%	65%	76%	100%
	<b>Total</b>	<b>26%</b>	<b>70%</b>	<b>100%</b>	<b>100%</b>	<b>23%</b>	<b>62%</b>	<b>100%</b>	<b>100%</b>	<b>40%</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>



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# Actions for electricity access

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<b>Sector / Issue</b>	<b>Actions</b>
<b>Financing</b>	Establishment of a Energy Development Fund (EDF)
<b>Grid</b>	Develop long-term financial planning for grid
	Implement cost-reflective tariff calculations to include demand projections
<b>Harmonise grid &amp; off-grid planning</b>	Improve publicly available data on future grid extension plans
	Identify long-term saturation levels of grid access
	Target productive users and public service connections
<b>Mini-grids</b>	Develop regulatory frameworks and enabling environment
<b>Off-grid</b>	Development and approval of off-grid strategy
	Financial support for companies and equipment retailers, supporting new business models such as pay-as-you-go to address affordability, and consider subsidy design for poorest households
	Develop and implement international quality standards
	Raise consumer awareness through campaigns
	Fiscal policy options including VAT reductions on solar equipment
	Data & analytics to be developed to monitor the sector and evaluate programmes

# Actions for Sustainable Biomass

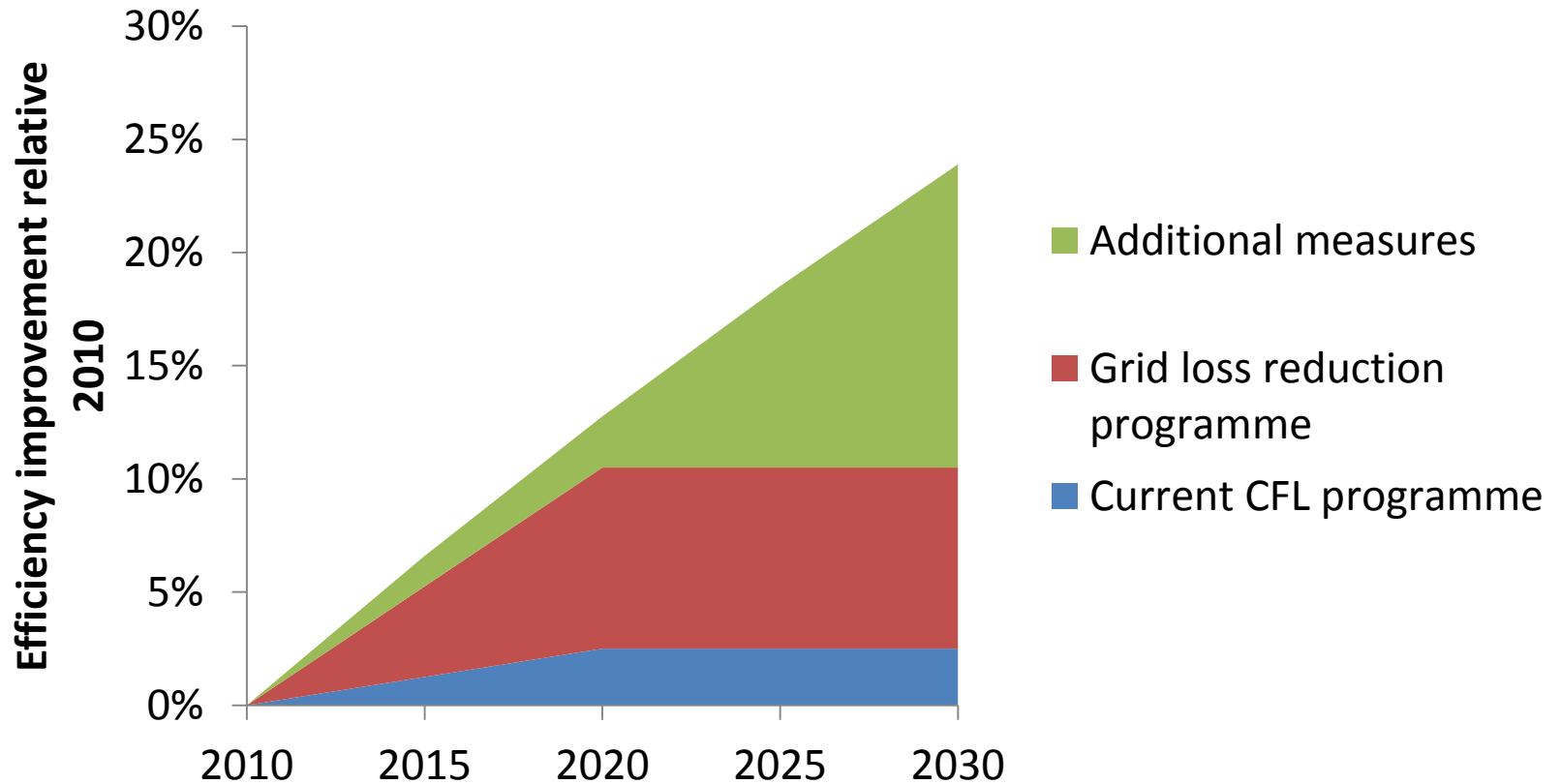
Sector / Issue	Action
<b>Sector strategy</b>	Update Biomass Energy Strategy (BEST)
	Review biogas and charcoal sectors to assess market and policy needs
<b>Financing</b>	Incorporation of biomass and cookstove sectors into national financing mechanisms such as Energy Development Fund
	Review subsidy designs and assess fiscal measures to incentivise more efficient stoves (Tier 3-4), and rationalise tax regime for charcoal
<b>Stoves</b>	Phase in standards and certification for cookstoves to gradually shift the market from towards Tier 2-4 models
	Public awareness campaigns to promote of improved cooking options
	Support manufacturing of higher quality stoves (Tier 2-3)
	Develop alternatives such as biomass pellets
	Develop M&E framework to support the strategy
<b>Wood production</b>	Review regulatory approach to ensure it is effective at providing incentives for small landholders to invest, increase planting, productivity
	Develop a national inventory of current and potential plantation productivity
	Improve management of larger private plantations
	Improve management of government plantations (~20% of total)

# Doubling the efficiency of biomass energy use for cooking

Proposed ISO Tier	Illustrative stove type	Efficiency	Energy savings rel. to Tier 0
Tier 0	3-stone fire	<15%	0%
Tier 1	ICS	>15%	23%
Tier 2	Rocket stove	>25%	>40%
Tier 3	Forced draft	>35%	>57%
Tier 4	LPG / advanced biomass	>45%	>67%

- Very large efficiency savings are possible
- Cookstove standards have been developed according to different 'tier' levels
- Performance judged by efficiency **and by level of emissions**
- Significant health benefits from higher-tier stoves
- Top-performing stoves require biomass pellets rather than raw wood to get reliable and controllable burn rate

# Extend current rates of electrical efficiency improvement to 2030





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# Actions for Energy Efficiency

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Issue	Action
<b>Develop strategy including EE institutional arrangements</b>	Assess technical potential in all sectors, and identify policy and financing instruments required to overcome barriers
	Develop implementation options including dedicated technical unit within the proposed Energy Development Fund.
	Develop and implement a long-term grid-loss reduction plan
	Assess potential for industry energy audits, develop benchmarks
	Assess role of performance standards, including EAC-wide standards and labelling
	Consider role of green procurement, including necessary legal requirements
<b>Enabling actions</b>	Implement necessary enabling actions such as behavioural change campaigns, addressing affordability issues, and stimulating private sector investment
<b>Buildings</b>	Revise building codes for commercial buildings, and assess potential for net-zero energy consumption in the longer-term
<b>Appliances and equipment</b>	Assess additional market transformation policies that may be needed to complement planned EAC standards & labelling .
<b>Efficient lighting</b>	Phase-out of inefficient lighting products, particularly incandescent lightbulbs. Consider promotion of LEDs instead of CFLs
<b>Industry</b>	Consider complementary policies to support industrial energy efficiency, including possibility of additional incentive mechanisms such as carbon financing.

# Nexus Targets

Nexus Issue	Issue	Target
<b>Health</b>	Indoor air quality from cooking.	All households to be at least Tier 3 or above air quality standards by 2020
<b>Water</b>	Coordination of water planning.	By 2018, all hydropower and multi-use schemes fully assessed for climate vulnerabilities. Adaptation and risk-mitigation measures identified and costed.
<b>Food</b>	Land-use competition	Beyond 2020, no net expansion of land use for forestry or other energy production to avoid food security impacts
	Energy consumption for irrigation	Solar PV pumps routinely considered
<b>Gender</b>	Time spent on biomass collection	Zero time target reached by population in rural areas spent collecting firewood by 2020.
	Quality of cooking options	women taking the lead in the selection of technologies and national awareness campaign on the use of clean cooking technologies
	Training	Provide training and skills (e.g., on better water management, biogas installations, improved cookstoves etc.)
	Employment	Women as actors in the value chain for marketing the stoves as energy entrepreneurs

8.5 MW Solar  
PV Plant,  
Rwanda



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**THANK YOU**

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