Role of Bioenergy in IEA ETP Scenarios

IEA: Energy Technology Perspectives 2015

Bioenergy is largest primary energy carrier in 2 DS in 2050
The share of non-hydro renewable electricity generation is rising

...... however bioenergy’s share drops due to faster growth of onshore wind and PV.
Bioenergy generation by region (2006-20)

As growth slows in some major OECD bioenergy markets, higher levels of generation are anticipated in certain non-OECD countries with abundant resources and policy drivers.
Increased competition from other renewables

**Historical and forecast global weighted average generation costs for new onshore wind and PV plants vs. selected reference bioenergy LCOEs**

![Graph showing generation costs for different energy sources](image)

**High levels of incentives are no longer necessary for solar PV and onshore wind in many markets**

**Support for bio-electricity focussing on the most promising applications.**
## Notable marketplace adjustments 2014-15

<table>
<thead>
<tr>
<th>Country</th>
<th>Revision</th>
<th>Market Impact</th>
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<tbody>
<tr>
<td>Canada</td>
<td>Coal to biomass conversions stimulated by phase out of coal in Ontario.</td>
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<td>Brazil</td>
<td>Recent renewable energy Power Purchase Agreement (PPA) auctions held over the 2013-14 period offered more favorable terms to bioenergy projects.</td>
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<td>Korea</td>
<td>Annual increase in requirements of Portfolio Standard (RPS) for 13 largest power companies drives biomass co-firing.</td>
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<td>Germany</td>
<td>Downward FIT adjustments, removal of some project-specific bonus tariffs, restriction of new capacity eligible for support to 100 MW per year until 2017, with support then phased out entirely for new plants above 100 kW.</td>
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<td>Poland</td>
<td>Support for biomass will reduced in existing green certificate scheme. Restrictions increased on volume of certificates awarded for co-firing.</td>
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<td>United Kingdom</td>
<td>No budget allocated for conversions within the initial Contracts for Difference (CfD) auction round (besides two coal projects already confirmed), and changes introduced which alter support for biomass unit conversions under the Renewables Obligation scheme. Climate Change Levy exemption for renewables removed.</td>
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Diverse policy adjustments affect bioenergy prospects in key markets.
Global conventional biofuels production forecast to stabilise over the medium-term, policy stability is required to provide a platform for investments in new production capacity.
Mandates effectively support global biofuels production

Comparison of global biofuels production and oil prices 2007-20 (indexed)

Blending mandates support demand, even with a low oil price environment.
Policy landscape for biofuels dynamic over 2014-15

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<th>Country</th>
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<th>Volume Required</th>
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<tr>
<td>Brazil</td>
<td>Ethanol blending mandate increased from 25% to 27.5%, biodiesel mandate increased from 5% to 7%.</td>
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<tr>
<td>India</td>
<td>Ethanol blending mandate increase to 10%. (proposed).</td>
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<tr>
<td>Indonesia</td>
<td>Biodiesel blending mandate raised from 10% to 15%.</td>
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<tr>
<td>Malaysia</td>
<td>Biodiesel blending mandate increased from 5% to 7% in some regions.</td>
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<tr>
<td>South Africa</td>
<td>E2 (2% ethanol) and B5 (5% biodiesel) mandates scheduled to come into force in the fourth quarter of 2015.</td>
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<tr>
<td>The United States</td>
<td>RFS 2 proposed volumes for renewable fuels, advanced biofuels and cellulosic ethanol in 2014-16 period revised down from statutory levels.</td>
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<tr>
<td>The European Union</td>
<td>Biofuels produced from starch-rich, sugar and oil crop feedstocks and cereal crops capped at 7 pp of the overall EU 10% target for renewable energy in transport for 2020. No specific sub-target for transport in the 2030 Energy Strategy.</td>
<td>▼</td>
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<tr>
<td>Germany</td>
<td>Climate Protection Quota introduced to replace 6.25% biofuel quota obligation.</td>
<td>?</td>
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</table>

Strengthening of biofuels policy support evident in new and emerging markets within non-OECD countries, while policy uncertainty present in key OECD markets.
Early commercialisation in the advanced biofuels sector

Commissioned commercial scale advanced biofuel plants

Canada
1 plant
Status: operational (2014)
Fuel produced: cellulosic ethanol
Feedstock: biomass wastes
Production capacity: approx. 38 million litres/year

Finland
1 plant
Status: operational (2015)
Fuel produced: biodiesel
Feedstock: crude tall oil
Production capacity: approx. 120 million litres/year

China
1 plant
Status: operational (2012)
Fuel produced: cellulosic ethanol
Feedstock: corn cobs
Production capacity: 75 million litres/year

United States
4 plants
Status: operational (2013-15)
Fuel produced: cellulosic ethanol
Feedstocks: agricultural residues, e.g. cornstover, wheat and barley straw, and biomass wastes
Combined production capacity: approx. 320 million litres/year

Italy
1 plant
Status: operational (2013)
Fuel produced: cellulosic ethanol
Feedstocks: rice and wheat straw, giant reed
Production capacity: approx. 75 million litres/year

Brazil
2 plants
Status: operational (both 2014)
Fuel produced: cellulosic ethanol
Feedstock: sugar cane bagasse
Combined production capacity: approx. 120 million litres/year

Advanced biofuels – needed for long-term decarbonisation of the transport sector – are starting to scale up.
Production costs assessment for cellulosic ethanol

Analysis of a breakeven crude oil price for cellulosic ethanol

- Consideration of a current breakeven oil price for cellulosic ethanol
- Opportunities for future cost reduction

Production costs for cellulosic ethanol anticipated to be above 2015 oil prices, but significant cost reduction potential identified within the industry.
Further policy support required to accelerate growth in renewable heat

Challenges persist to increasing the contribution of renewables and decarbonising the heat sector, however established renewable heat policies have proved successful.
Lower heating oil prices mean increased competition for domestic biomass systems

Medium-term forecasted growth in wood pellet system installation (left) and delivered domestic fuel cost comparison 2012-15 (right) in Austria

Downward movement in heating oil costs has reduced running costs from oil-fired heating systems and closed the fuel price gap to pellets.
Conclusions

- Renewable growth continues despite low fossil fuel price context and policy uncertainties.
- The effect of the lower oil price environment is less pertinent for bioenergy for power, but biofuels and heat sectors are impacted in some circumstances.
- Bio-electricity faces potential competition from lower cost renewables, with opportunities focused on low cost and well integrated projects.
- Continued policy action is needed for heat and biofuel sectors. Policy uncertainties risk undermining investor confidence and are dampening growth.
- Good progress in commercialisation of advanced biofuels and significant cost reduction potential but long term policy and market framework uncertain.
- Integration is the key!
For further insights and analysis...

- The *Medium-Term Renewable Energy Market Report 2015* was launched on 02 October 2015 and can be purchased online at:

  [www.iea.org](http://www.iea.org)

- Thank you for your attention!