Technology Collaboration Programme
by IEA

IEA Bioenergy

Summary Series

IEA Bioenergy: Task 36: May 2020

Trends on use of solid recovered fuels

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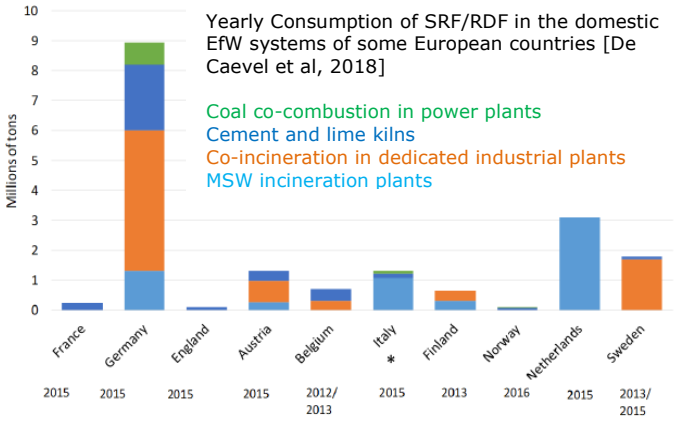
SUMMARY

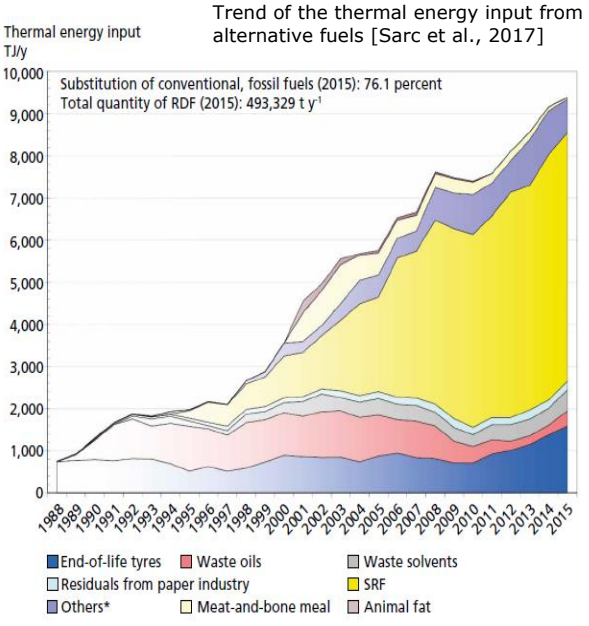
Solid Recovered Fuels **(SRFs)** are a subset of the large family of Refuse Derived Fuels (RDFs), consisting of processed fuels that meet quality requirements for economic, technological and environmental needs defined in a standard (e.g. EN 15539 in Europe or JIS Z7311 in Japan). In some countries such as Germany they are also certified through a quality trademark. An SRF compliance with other stringent quality requirements can be asked for in practice through voluntary commitments (i.e. specifications) among end-users (e.g. cement kilns, power plants or gasification plants) and SRF producers. The report shows that the SRFs available in the market do not identify with a specific fuel, but with fuels with different qualitative figures (e.g. composition, physicochemical properties). This is due to different factors of which the main drivers are quality and markets (end-user) requirements and local regulations. The collected country data show that unlike SRFs, "low grade" not standardized RDFs are largely produced and used in waste-to-energy (WtE) systems both in Europe and in other countries. Furthermore, SRF is often referred to with different names: RPF, PBG, SBS, WDF, CSR... and largely also RDF. The equivalence with an SRF, as identified above, is not always so clear, even where common regulations already exist as in Europe with the EN 15359. SRFs are largely produced and traded as waste. In some countries, an end-of-waste SRF is now legally admitted based on a compliance with well-defined rules for the fuel production process, quality and end-use.

The added value of SRF for the WtE sector has long been recognized in the European countries (see Figure on the right) or in Japan which historically moved first towards the exploitation of the waste potential for energy production. **Incineration plants** (MSW-I: FBB and grate technology) as well as **industrial co-incineration plants** exploited the potential of SRF to fulfil their own heat/electricity demand or, somewhere, also to benefit economically from placing electricity on the national grid. Developments are occurring in the power and district heating sector, while other sectors such as steel/iron, pulp/paper, glass and chemical industry are generally still little explored. That could change rapidly if circumstances such as oil price or real pricing of CO_2 among others will become beneficial.



Yearly Consumption of SRF/RDF in the domestic EfW systems of some European countries [De Caevel et al, 2018]

Cement industry in Austria.
Trend of the thermal energy input from alternative fuels [Sarc et al., 2017]



Energy-intensive industrial sectors (e.g. **cement** and lime manufacturing **industries**, coal fired power plants) have increased their demand for **high quality SRF** over time. Based on the data and the opinions of experts collected for the purposes of the study, such industrial sectors could be the main SRF end-users in different European countries in a medium-term perspective. In particular the cement industry is expected to increase the thermal substitution rate (TSR, in some cases already high: 41% in EU-28, >60% in Germany, Czech Rep., Austria in 2014), with a mix of alternative fuels, to which SRF significantly contributes both with mass and energy (see Figure on the left). India and China have more recently started to develop a domestic production of SRF from MSW and industrial wastes. In China, the ongoing intensive growth of the incineration industry, mainly focused on the FBB technology, could become a large end-user of SRF. The same is expected for the cement manufacturing industry in both China and India (the largest cement consumers and producers in the world), particularly if existing barriers (technological, legislative, economical…) will be quickly removed or reduced. A significant **transboundary shipment of SRF** (e.g. China; India; Europe with UK as the main exporter and The Netherland, Germany and Sweden the main importers) denotes an internal demand for SRF locally or not adequately supported by the capacity of MT/MBT plants and/or satisfied at a more competitive cost by the imported fuel (recipient countries), or lower than the domestic production (exporter countries).

CONCLUSIONS

The current SRF market shows a different **degree of development** in the examined European and extra-European countries. The **energy-intensive industrial sectors** have increased their fuel demand over time, and it is expected to grow even further where the end-users (e.g. Europe) have the potential to quickly become technologically able to exploit the economic and environmental benefits that SRF can offer. Some **factors** (might) play a role as driver or barrier in the national and global SRF market:

- Different **policy choices and strategies** on waste management (a local driver/barrier)
- **SRF supply**: High bureaucracy for producers (barrier in some countries); productive capacity and performance of MBT/MT systems (driver or barrier depending on the country); well shared knowledge of the quality of SRF (driver for all the stakeholders); dependence on SRF import from third countries (barrier in some countries); public acceptance (barrier in some countries)
- **SRF demand**: Number and type of EfW plants equipped with technologies able to process SRF (driver or barrier depending on the country); competition with other sources for fossil fuel replacement (barrier in some countries); high bureaucracy for end-users (barrier in some countries); available or planned treatment capacity of the whole EfW system (driver or barrier depending on the country); public acceptance (barrier in some countries).
- An **SRF well complementary to the waste recovery and recycling priorities** and the route towards a circular economy, together with the availability and recognition of **common rules for SRF** to positively stimulate the SRF market and to enhance the public acceptance. The international effort in place within the International Organization for Standardization (ISO) shall be a useful driver in this direction too.

The full report is available at http://task36.ieabioenergy.com/publications/