



An example on organizing asphalt recycling: The Info Centre for Recycling of Asphalt in Norway



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Where is Norway?

Norway is one of the Nordic countries;

- up-west corner of Europe
- facing the Atlantic ocean
- Gulf-stream waters from Mexico (warm)
- Arctic winds and waters (cold)



Pavement engineering challenges;

- southern vs. northern conditions
- coastal vs. inland conditions
- precipitation; rain and snow
- rapidly changing temperatures
- high and low temperatures



Nordic countries use studded winter tires



Studded tires - pavement consequences



Studded tires cause **severe rutting**:

- reduced traffic safety
- increased maintenance costs
- dust and health problems in cities

Studded tire wear - rutting repair

After winter season the most severe rutting must be removed. Thus, the main roads are frequently milled;

- road planers (milling the whole traffic lane), or
- track milling (milling the deep wheel tracks) with subsequent track paving

This milling generates large quantities of RAP materials



Resource situation

- In most countries high quality aggregates are scarce resources
- Norway exports 30 mill tons/year of high-quality crushed stone aggregates
- Reclaimed asphalt (RAP) from milled or excavated/crushed old pavements are valuable materials
- In Norway RAP contains both high-quality rock materials and bitumen



Recycling of asphalt in Norway

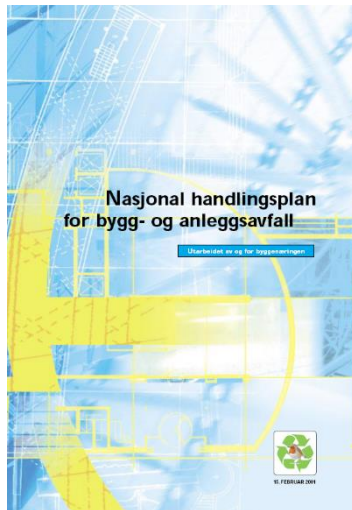
Milling and excavation operations on Norwegian roads and streets generate every year
> 1 000 000 tons of old/reclaimed asphalt materials



Year 2001 – turning point for recycling in Norway

- Heavy construction material waste, including asphalt, were too often seen in “wild fills” (often to avoid the high taxes on waste; 50 - 150 € /ton)
- Strong need for info and knowhow - reduce conservatism and scepticism:
 - “How to get rid of” => “How to utilise”
 - “Waste materials” => “Valuable resources”
- How can we all work together on this task?

National action plan
for construction
waste



The info centre for
recycling of asphalt
("Kontrollordningen
For Asfaltgjenvinning")



History of KFA (The Info Centre for Recycling of Asphalt)

- Established 2001
- Voluntary association between road owners (represented by Norwegian Public Roads Administration) and the asphalt industry (producers, contractors, suppliers).
- Ambition: Establish an efficient system for asphalt recycling in Norway
- Objective: **80 %** recycling/reuse (within 5 years)
(**European Union**'s construction waste objective: **70 % recycling/reuse by 2020**)



Execution of the work on behalf of KFA:
Veiteknisk Institutt (“Road Technology Institute”)

Financing

- KFA is financed by a **green fee (earmarked tax)** on bitumen for road applications
- The current tax (2021) is 7 NOK (\approx 0,8 US dollar or 0,7 €) per ton bitumen
- Bitumen consumption in Norway is about 350.000 tons/year
- This generates 2,5 mill NOK/year (300.000 US dollars), financing “The Info Centre for Recycling of Asphalt” (**KFA** in Norwegian)



www.asfaltgjenvinning.no



RAP storage sites

- KFA has established a **national register of RAP storage sites** (constantly updated)
- Currently 250 storage sites, through out the country (approved by environmental authorities)
- At these sites, the materials are collected, sorted and refined/processed. Storage limited to 3 years.
- The stockpile sites report their material streams yearly to KFA
- Samples for material quality are frequently taken and tested (environmental and mechanical properties). Special focus on coal tar (PAH16).



KFA activities

- Updating register of approved asphalt stockpile sites, including helping in establishing new sites
- Updated information on material streams in and out of these storage sites (volumes, type of materials)
- Updated information on applications of the RA materials
- Material testing; special focus on coal tar content (PAH 16) and other HSE related topics
- R&D; initiation, documentation and evaluation of different research activities and trials related to asphalt recycling (new materials, applications, equipment, techniques etc.)
- Information and promotion; guidelines, reports, seminars, visits

Asphalt recycling in Norway in figures

	2016	2017	2018	2019	2020
	tons	tons	tons	tons	tons
Collected					
Milled	257.163	237.490	208.338	232.014	228.489
Excavated	854.945	863.070	795.267	940.722	1 001.166
Total	1.112.108	1.100.560	1.003.605	1.172.736	1.229.655
Used					
In hot mix	281.673	366.722	328.605	330.692	465.251
In cold mix	16.884	16.988	6.958	10.752	26.507
Unbound	737.048	848.193	850.806	805.123	895.489
Total	1.035.605	1.231.903	1.196.152	1.146.567	1.387.247
Storage					
Milled	174.782	173.637	52.114	133.552	186.798
Excavated	945.346	904.838	701.408	657.239	691.164
Crushed	415.714	390.384	307.912	240.714	307.741
Total	1.535.842	1.468.859	1.061.434	1.031.504	1.185.703
Recycling ratio %	93,1	111,9	119,2	97,8	112,8

Do we match the overall objective on 80 % recycling?

YES 😊

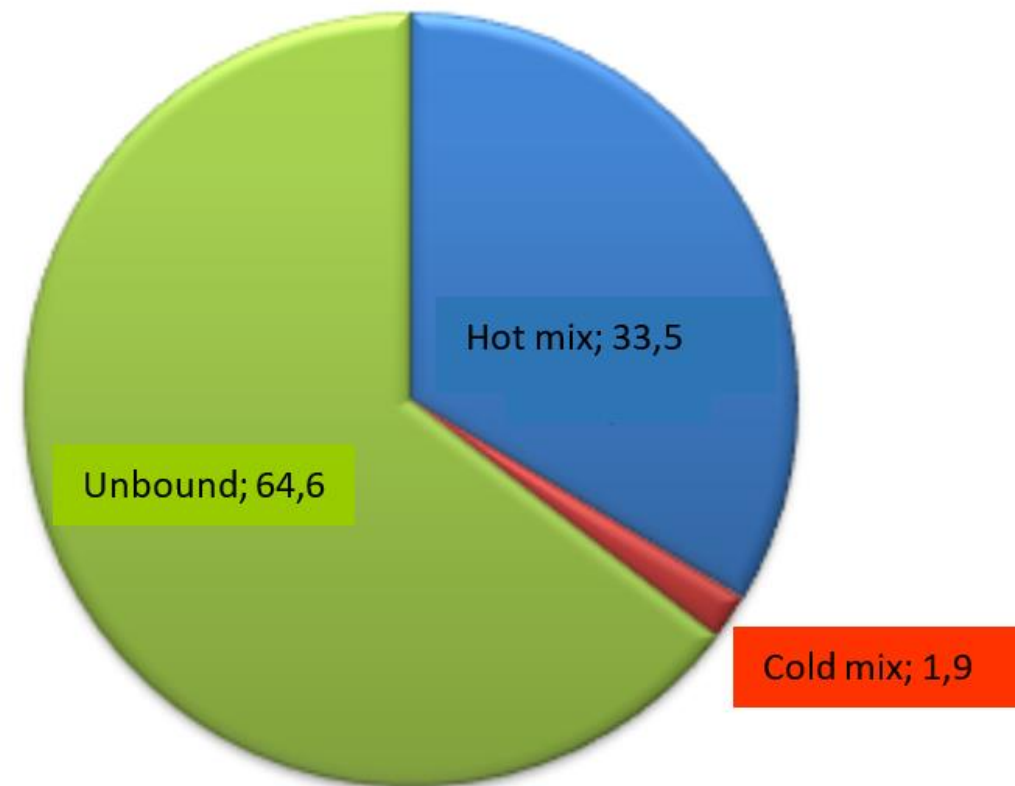
Figure 2: Key figures for asphalt recycling in Norway 2016-2020. (KFA Annual report 2020.)

Applications of RAP

Restrictions on RAP in top layers, due to studded tire wear, winter maintenance etc.

So, most quantities are used unbound, as base and subbase courses etc.

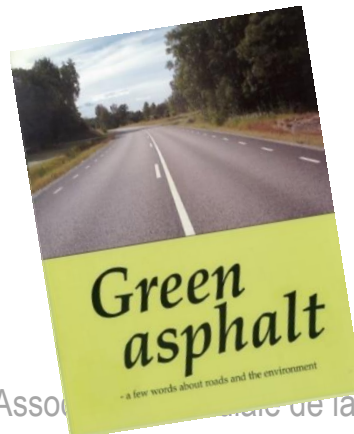
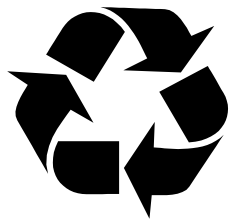
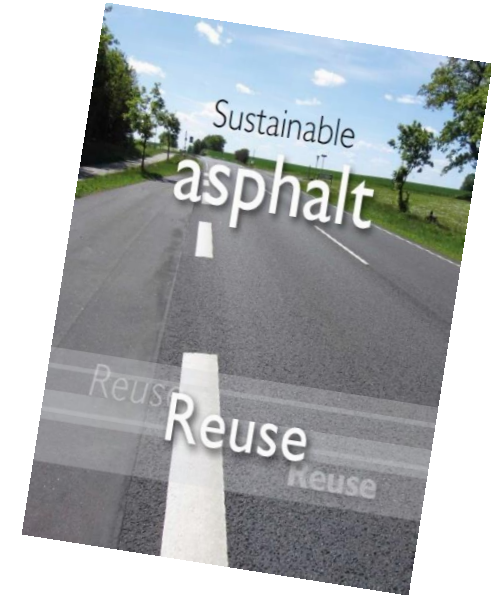
Want to increase the use in hot mixes



Applications of RAP in Norway (% of total collected volumes, 2020 figures).

Key factors for increased recycling in Norway

- **Green fee** on bitumen, financing “Info Centre for Recycling of Asphalt” (Norway)
- Asphalt contracts/ tender documents with special **bonus** for use of recycled materials
- **EPDs** (Environmental Product Declarations) and **CO₂** footprint as procurement criteria
- **Standardization** of RAP as raw material (EN 13108-8), opens also for updating our (conservative?) national specifications
- **Information** and motivation; reports, guidelines, seminars, workshops etc



KFA project example:

Using RAP as
aggregates in new
polymer modified
pavements on high-
volume roads
(see case study report)



KFA's board – satisfied with the work that has been done last 20 years



County roads

National roads

Contractors'
association

Contractors

National roads

Bitumen suppliers

Contractors



Thank you!

The North Cape in midnight sun