Environmental Engineering Division of JSME

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TOPICS

ABSTRACTS, FIGURES(inc.Japanese words) and CAPTIONS

[2020-1]

Hitachi Acoustic Research Lab for Sustainable Sound Environment

Masanori WATANABE, Yosuke TANABE, Hitachi, Ltd. Research & Development Group

[2020-2]

General Waste Treatment in Advanced Sustainable City

Tomohisa OTA,
TAKUMA Co.,LTD Technology Planning & Administration Dept.

[2020-3]

Reality and Challenge of Ultra-Low-Carbon Society

Shinji KAMBARA, Gifu University

[2020-4]

Turning Point of Heat Pump Technology

Seiichi YAMAGUCHI, Waseda University

[2020-1]

Hitachi Acoustic Research Lab for Sustainable Sound Environment

Masanori WATANABE, Yosuke TANABE,

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ABSTRACT [2020-1]

We humans live in the natural environment of the earth, where there are various sounds. Some sounds are natural, such as the babbling of rivers and birdsongs, while others are artificial, such as railways and home appliances. It is generally said that natural sounds do not become uncomfortable even if they are loud, but artificial sounds are unpleasant as noise. Therefore, Hitachi is working to reduce the noise of products in order to contribute to the creation of a sustainable sound environment. In recent years, we have begun not only reducing the noise of products but also sound design that takes sound quality into account. This paper introduces Hitachi acoustic research lab for development of reduction technology by experimental approach.

FIGURES(inc.Japanese words) and CAPTIONS [2020-1]

Table.1 Research target

製品分野	主な製品
鉄道車両	英国高速鉄道，新幹線
自動車機器	高圧燃料ポンプ，電動パワーステアリング
生活家電	洗濯機，掃除機
空調機器	ルームエアコン，業務用エアコン
その他	変圧器，圧縮機，産業用モータ

部屋	特徴	使用目的
無響室A	暗騒音0dB	超低騒音機器測定
無響室B	暗騒音6dB	汎用無響室
無響室C	騒音流量同時測定	空調機器測定
無響室D 残響室	カップルドルーム	吸遮音率測定
無響室E	暗騒音14dB	洗濯機測定
防音室A	暗騒音20dB	流体機器測定
防音室B	暗騒音20dB	汎用防音室

外観

無響室内部

Fig. 1 Measurement room configuration of Hitachi acoustic research lab

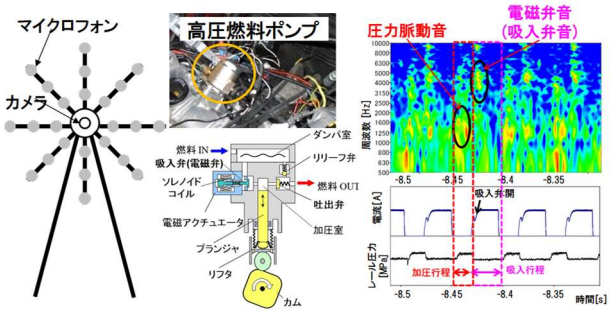


Fig. 2 Acoustic camera and its application to high pressure pump

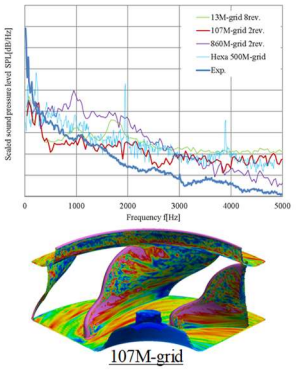


Fig. 3 Low noise chamber and its application to fan system

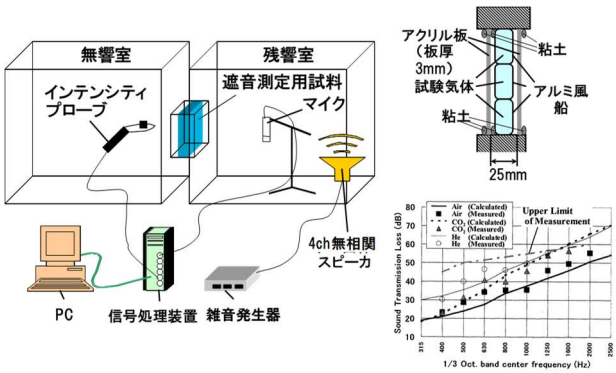


Fig. 4 Transmission loss measurement system and its application to hollow double wall

[2020-2]

General Waste Treatment in Advanced Sustainable City

Tomohisa OTA, TAKUMA Co.,LTD

ABSTRACT [2020-2]

In fiscal 2017 (FY 2017), Japan spent about 2 trillion yen on waste disposal, or 15,500 yen per person per year. Among them, the cost of outsourcing the disposal increased by about 2 times compared to FY 1998, while personnel expenses in FY 2017 decreased by about 40% compared to FY 1998.

This is thought to be due to the fact that municipalities entrust the collection and disposal of waste not under their direct management but to administrative associations and private businesses, and this is expected to increase in the future.

For the advanced and sustainable municipal solid waste treatment business, it is necessary not only to reduce the cost of the waste treatment business but also not to degrade the quality of municipal solid waste treatment. As for general waste treatment plant, low-carbon general waste treatment plant that make the most of the value of the facilities and enhance the social infrastructure function are required.

FIGURES(inc.Japanese words) and CAPTIONS [2020-2]

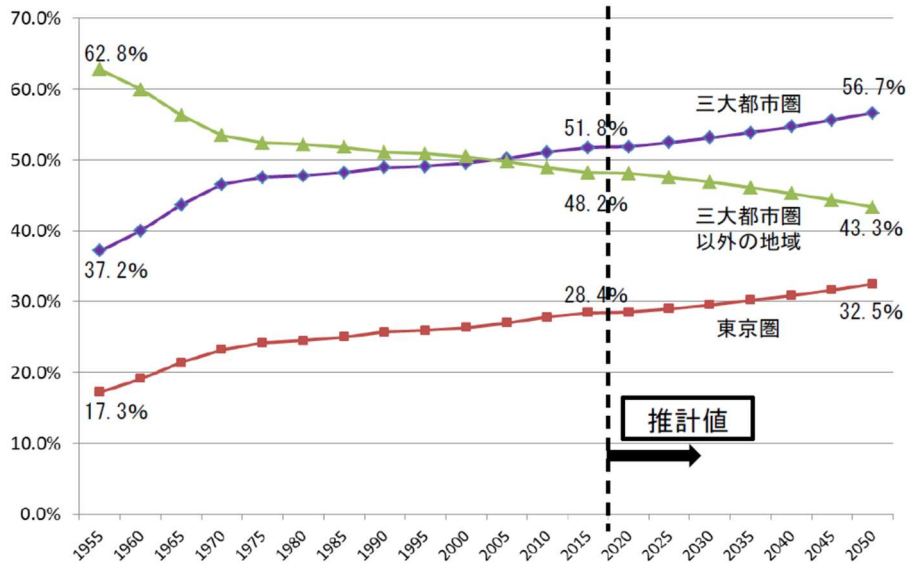


Fig. 1 Percentage of the population of the three major metropolitan areas and the Tokyo area to the total population

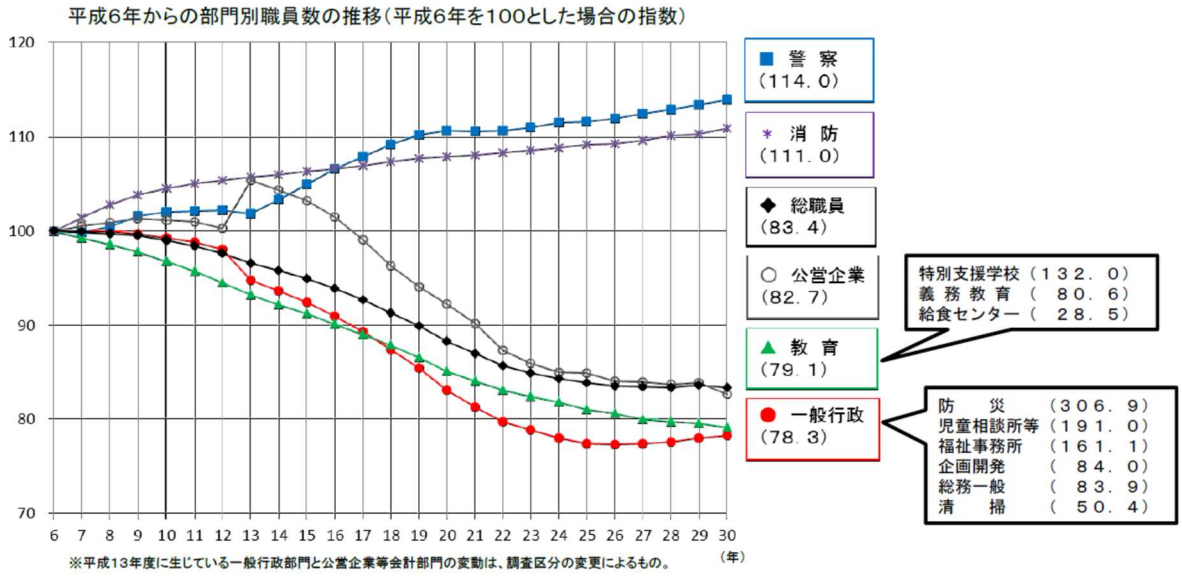


Fig. 2 Changes in the number of local government employees by sector (1994 to 2018 years)

Table 1 Trends in Waste Disposal Business Expenses

（単位：百万円）

区分＼年度			1998年度	2003年度	2008年度	2013年度	2017年度
ごみ処理事業経費			2,249,039	1,960,037	1,816,944	1,851,007	1,974,451
建設改良費			733,412	342,052	179,696	257,470	359,695
処理及び維持管理費等	人件費		634,939	561,777	495,676	398,352	372,562
	処理費		353,834	391,043	386,103	357,689	325,467
	委託費	収集運搬	—	–	292,206	322,076	357,374
		中間処理	—	–	279,650	315,982	366,214
		委託費合計	403,036	545,482	640,152	711,287	798,578
小計			1,480,394	1,536,216	1,530,149	1,473,803	1,503,757
建設改良費+処理及び維持管理費等			2,213,806	1,878,268	1,709,845	1,731,273	1,863,452
1人当たりのごみ事業費用(円/人年)			17,800	15,400	14,200	14,400	15,500

[2020-3]

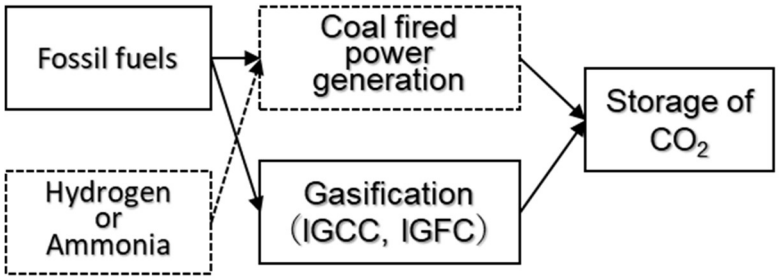
Reality and Challenge of Ultra-Low-Carbon Society

Shinji KAMBARA, Gifu University

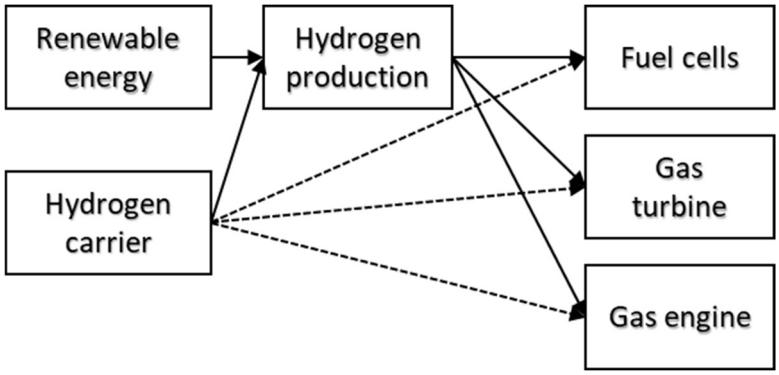
ABSTRACT [2020-3]

Under the Paris Agreement, Japan has decided a goal to reduce greenhouse gases by 26% in FY 2030 compared to FY 2013. It is desirable that CO2 free energy systems be applied early to Japanese society. For that purpose, development of a low-cost energy system is necessary. At each stage of hydrogen production, storage, transport and utilization, it is necessary to change the approach of R & D so far. In hydrogen production, innovation is necessary. In power generation using green hydrogen and green ammonia, renewal of the completed technology such as internal combustion engines greatly contribute to cost cut.

FIGURES(inc.Japanese words) and CAPTIONS [2020-3]



(a) Large-scale power generation system



(b) Power generation system for distributed power supply

Fig. 1 CO2 free power generation system

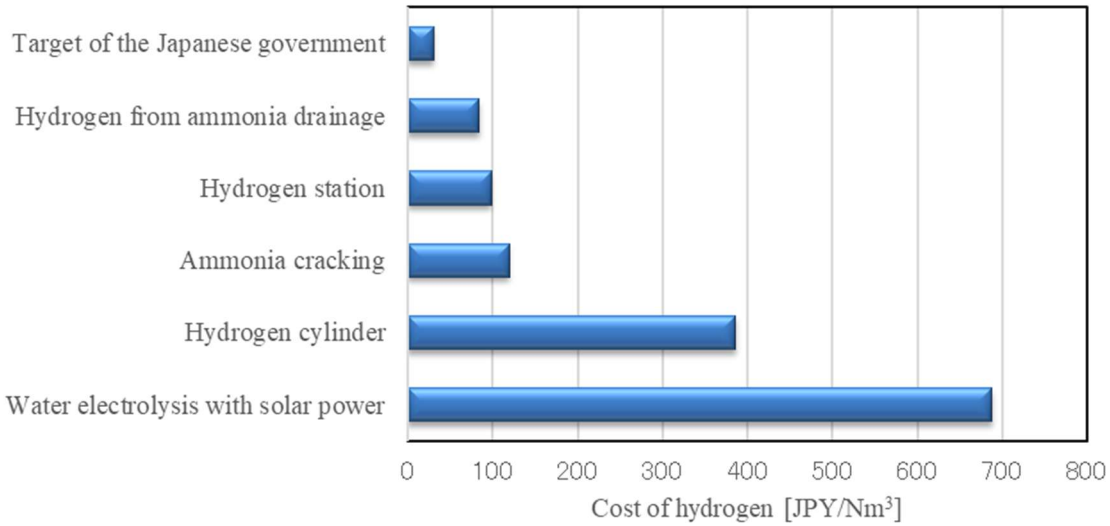


Fig. 2 Estimated cost of hydrogen for various hydrogen production systems

[2020-4]

Turning Point of Heat Pump Technology

Seiichi YAMAGUCHI, Waseda University

ABSTRACT [2020-4]

A heat pump is one of the promising technologies for energy saving society thanks to its high theoretical COP, Coefficient Of Performance, and general versatility. Heat pump technologies are currently at a major turning point from viewpoints of the performance evaluation and the optimal system control to fulfill its potential in the real world. The performance of heat pumps has been evaluated under steady state conditions and without system controls. However, these evaluation conditions are practically far from real operating situations. In the real operating condition of an air-conditioner as an example of application of heat pumps, the system constantly behaves dynamically using system control schemes according to changes in set temperature, heat load, outdoor air temperature and other various situations. This report presents several points of view about the evaluation of heat pump systems.

FIGURES(inc.Japanese words) and CAPTIONS [2019-4]

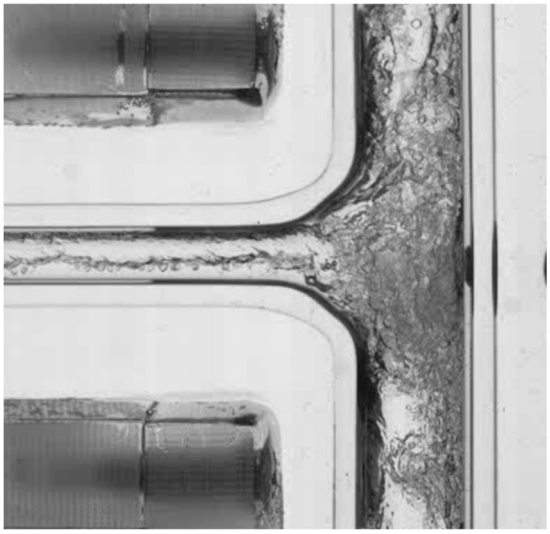


Fig.1 Visualization of two-phase flow distribution in heat pump

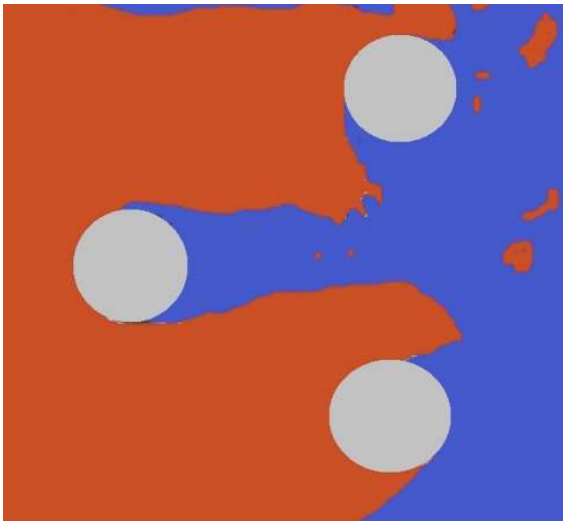


Fig.2 Visualization of frost formation in finned tube heat exchanger