EU-China-Safe 4th e-Newsletter, April 2022

Delivering an Effective, Resilient and Sustainable EU-China Food Safety Partnership

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Welcome to the 4th edition of the EU-China-Safe e-Newsletter.

EU-China-Safe was four and half years EU funded project that aims to mobilise resources in Europe and China to develop a cohesive partnership that will deliver a shared vision for food safety and authenticity and work towards "mutual recognition".

Comprising 15 participants from the EU and 18 from China, EU-China-Safe contains key research organisations, government and industry needed to develop and jointly implement major advances in improving food safety and combating food fraud in the two trading blocks.

The aim of this newsletter is to provide you with a brief summary of the project and update you on some of the progress and project activities. We hope you find the newsletter useful.

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EU-China-Safe IN A NUTSHELL:

Key facts:
Horizon 2020 Project

Acronym:
EU-China-Safe

Website:
www.euchinasafe.eu

Duration:
54 months
September 2017 - February 2022

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Strategic objective of EU-China-Safe is:

To develop and implement a shared vision of best practice within the EU and China that will enhance food safety, deter food fraud, restore consumer trust, deliver mutual recognition of data and standards and support the flow of agri-food trade between the two trading blocks to promote economic growth.

EU-China-Safe will build the core components needed for a joint EU-China food safety control system comprising: control management, food legislation, food inspection, food control laboratories, and food safety and quality information, education and communication.

The project will develop an EU-China Joint Laboratory Network that will achieve and demonstrate equivalency of results, and will develop a state of the art virtual laboratory, with interchangeable staff from two continents, that will be used as a "showcase" to communicate and demonstrate best practice. Innovative traceability tools will strengthen the most vulnerable supply chains. New or improved detection capabilities for chemical/microbiological hazards and food fraud will be implemented in a harmonised way across the EU-China network. Trade barriers caused by food safety and fraud issues will be analysed and recommendations of how to predict and prevent future events disseminated.

The project will focus on the most commonly reported foods linked to chemical and microbiological contamination and fraud (infant formula, processed meat, fruits, vegetables, wine, honey, spices).

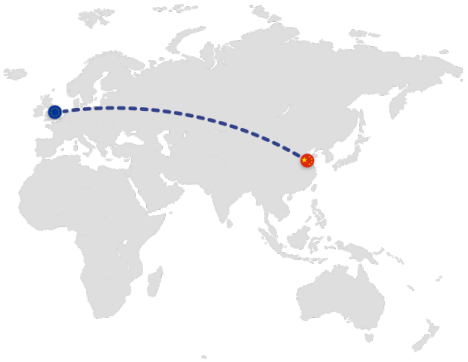
Substantial knowledge transfer and training actions will build high-level and long-term collaboration, synergies and trust between a wide range of EU and China actors. These advances, in addition to a wider range of confidence building measures towards food safety, authenticity and transparency, will address consumer expectations and facilitate an expansion of EU- China trade.

EU-China-Safe PROGRESS:

Implementation of innovations in food traceability

EU-China-Safe aims at exploring various traceability techniques and technologies of several products moving between Europe and China. The main challenge related to food product traceability is that there is not necessarily a connection between the actual properties of a food product and the claims made in the traceability system. The final outcomes will be a digitised, DNA-based traceability system using blockchain to provide trustable data. A suite of traceability management and collaboration tools designed to support open and transparent sharing of information between supply chain members in both the EU and China, aiming to prevent a major food safety crisis, and alerting tools to identify inconsistencies in data recorded in traceability systems will be developed.

Tasks focused on implementation of innovations in food traceability have demonstrated effective new techniques, learnings and software that can tackle the issues around traceability and verification within supply chains.



(i) **Digital traceability solution making use of DNA analysis and blockchain technology** for end-to-end traceability of the pork products from the farm in the UK to final destination in China was developed and trialed.

(ii) Development of **risk-based traceability management tools**, as well as the expansion of the arc-net platform in Pro-active Traceability Alerting tools, bringing alerting and warning systems to the existing traceability solution, was finalised. This brings opportunities to predict supply chain issues before they occur and identify them in real time as they do. By adopting these complete solutions into the food production industry, it can offer secure, trustable, and transparent traceability leading to increased safety and confidence in the EU-China supply chain.

(iii) **Value chain mapping and analysis for EU-China wine chains**, evaluation of data quality, discrepancies and inconsistencies, and possible fraud / tampering / substitution in EU-China wine chains was completed.

(iv) **Specification of an alert system to guide further checks and analysis in EU-China wine chains** and in general was finalised.

Mapping the local-global wine supply chain from the Bordeaux region in France to China enabled identification and highlighted points of weakness. The mapping and analysis of the supply chain, and the indication of where fraud might happen was partly based on existing scientific literature, reports, and news stories, and partly on a number of interviews conducted with supply chain actors in France and in China.

Read the reports on:

Mapping the local-global wine chain from Europe to China: Towards shared standards and benchmarks in wine traceability and authenticity

Application, limitations, costs and benefits related to the use of blockchain technology in the seafood industry

All EU-CHINA-SAFE publications >>>

Implementation of innovations in food authenticity

EU-China-Safe aims at developing, transferring knowledge and implementing innovative research methods and processes for combating food fraud. Methodologies for detection of food fraud developed both in the EU and China will be transferred both ways, from the EU to China, and from China to the EU. The methodology will focus on five product groups which are all very susceptible to fraud, i.e. wine, dairy products (infant formula), processed meat, organic fruit and vegetables, and spices. Methodologies are based on the latest technology and include state-of-the-art laboratory-based confirmatory methods. Handheld, portable machine vision based methods for on-site screening will be trialled. In most cases the Standard Operating Procedures (SOPs) of the existing methodology will be exchanged and the methods implemented in the laboratories of the other partners.

(i) **The transfer and implementation of fraud detection methods for five product groups which are all very susceptible to fraud**, i.e. wine, dairy products (infant formula), processed meat, organic fruit and vegetables, and spices were completed.

The methodologies, developed both in the EU and China from previous research and established practices, for the detection of food fraud have been transferred and implemented both ways, from the EU to China, and from China to the EU. The method exchange and validation with industry partners have also been performed for some of the product groups.

The partners have completed the implementation of state-of-the-art laboratory-based confirmatory methods and novel, portable on-site screening methods. For **Wine**, the method questionnaire, availability matrix, isotope workshop and sampling have been completed successfully as well as the method establishment. CNRIFFI has established all assigned methods and will serve as multiplicator and trainer to other Chinese laboratories. Method performance comparison between EU and China has also been completed. For **Dairy products**, the LC-MS method development for protein contents has finished. SOPs and patents have been drafted for the different methods, while ZJTH has worked on proceeding with the GB standards for major whey and lactoferrin, respectively. For **Processed meats**, confirmatory LC-MS methodology for the detection of water-retaining additives, and a spectroscopic screening method (using the SupNIR-1520 portable near-infrared spectrometer) for the adulteration of processed meat products have been developed and promising results have been obtained. Both methods have also been exchanged with the industry partner. For **Organic fruits and vegetables**, MS-based methodology has been transferred to the Chinese partner and method performance has been compared. For **Spices**, the methodology for spice authentication (protocols for analysis of dyes in paprika powders generated by WU) has been exchanged with the Chinese partner (BJCDC). The method setup for the on-site/portable/handheld authentication of spices has been completed at WU (using the Specim IQ hyperspectral imaging camera) and QUB (using the SCiO molecular sensor). Sample collection, exchange and analysis has also been completed. In-house and industry partner validation, and reporting has been completed as well.

Look at the Methods for food authenticity testing (EU-China-Safe VIRTUAL REFERENCE LAB) and some of the EU-China-Safe papers:

Teresa M. Müller, Qiding Zhong, Shuangxi Fan, Daobing Wang, Carsten Fauhl-Hassek**: What's in a wine? – A spot check of the integrity of European wine sold in China based on anthocyanin composition, stable isotope and glycerol impurity analysis.** Food Additives & Contaminants: Part A (2021) Vol 38 (8).

Sara W. Erasmus, Lisanne van Hasselt, Linda M.Ebbinge, Saskia M. van Ruth: **Real or fake yellow in the vibrant colour craze: Rapid detection of lead chromate in turmeric.** Food Control (2021) Vol 121, 107714.

Schusterova D., Hajslova J., Kocourek V., Pulkrabova J.: **Pesticide residues and their metabolites in grapes and wines from conventional and organic farming system.** Foods (2021) 10(2) 307.

Claire McVey, Christopher T. Elliott, Andrew Cannavan, Simon D. Kelly, Awanwee Petchkongkaew, Simon A. Haughey: **Portable spectroscopy for high throughput food authenticity screening: Advancements in technology and integration into digital traceability systems.** Trends in Food Science & Technology (2021) Volume 118, Part B, Pages 777-790.

(ii) Development, adaptation and implementation of the **assessment of fraud vulnerability in selected food chains** finalised. Partners have completed the examination of the vulnerability of the actors in the wine and spices' supply chains in the EU and China.

Food fraud vulnerability assessments provided interesting insights in the EU-China wine supply chain and the China-EU spice supply chain networks and understanding the contributions of various fraud factors to the overall fraud vulnerability. An amended version of the SSAFE Food Fraud Vulnerability Assessment Tool (FFVAT) was used for this purpose. The assessments showed that fraud vulnerabilities in the EU-China wine supply chain are medium to high level, with a high level of opportunities, medium level of motivational drivers and medium level of control measures implemented in the chain. The wine supply chain shows a high level of vulnerabilities, whereas the spice supply chain appears more resilient against fraud. Even though results showed that the opportunities and the motivations of the China-EU spice supply chain are lower than those in the EU-China wine chain, current control measures along the supply chain can still be improved, especially the external supplier controls.

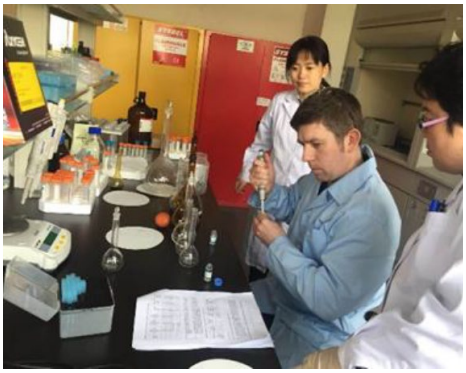
All EU-CHINA-SAFE publications >>>

Implementation of innovations in food safety

EU-China-Safe aims at (i) addressing current challenges and gaps in microbiological and chemical food safety testing through the implementation of new or improved analytical methods; (ii) transferring analytical methodology and harmonise testing between China and the EU; (iii) improving the safety and quality of food consumed in Chinese and European markets; and (iv) improving the food safety infrastructure in both China and the EU.

A range of analytical tools and protocols were developed and shared between the EU and China over the course of the project to improve the monitoring of chemical residues and biological pathogens in different food matrices.

A complex multiplex LC-HRMS/MS method was established in both EU and Chinese laboratories for the analysis of nearly 400 **contaminant residues in plant based materials**. The method uses a highly efficient software based approach that was developed to handle big data. It was also evaluated through inter-laboratory studies showing its excellent potential for the analysis of multiple contaminants in plant based materials.



In addition to HRMS methods a **multianalyte enzyme inhibition screening method** has been adapted for **selected phytosanitary products and food matrices** in order to provide the food industry with a useful tool that can be implemented in their control procedures.

The analysis of **antiviral drugs** and banned **nitrofuran antibiotics** (**Watch the video about this method**) was significantly enhanced through the development of three new methods. This timely because antiviral drug residues are to be added to EU monitoring programs from 2023. The possibility of emergent contaminant in meat has come to light due to the covid-19 crisis and Ugandan pork scandal. Fourteen drugs and metabolites (most of them antiretroviral drugs) were targeted, and a LC-MS/MS method was established for them in 2021.

The method for the analysis of **chlorates and perchlorates in milk and milk powders** was successfully transferred to Chinese laboratories. The results of validation showed that the method is simple, rapid and highly sensitive, and suitable for the determination of these residues in dairy samples.

Another method was established in EU laboratory for the analysis of **nitrates and nitrites in milk and dairy powders**, which can measure these contaminants to the Chinese limits.

Training content covering topics on **food contact materials** supporting knowledge development with respect to EU legislation and analytical methodologies was shared with the Chinese partners.

EU and Chinese researchers developed efficient whole genome sequencing approaches for the molecular characterisation of selected **foodborne pathogens** of importance to public health. This methodology is critical in terms of tracking and tracing the source of contamination in cases of foodborne illnesses.

Look at the Methods for food safety testing (EU-China-Safe VIRTUAL REFERENCE LAB)

Look at the methods on COVID-19 sampling and testing in food (EU-China-Safe VIRTUAL REFERENCE LAB)

Read some of the EU-China-Safe papers:

Clément Douillet, Mary Moloney, Melissa Di Rocco, Christopher Elliott, Martin Danaher: **Development and validation of a quantitative method for 15 antiviral drugs in poultry muscle using liquid chromatography coupled to tandem mass spektrometry.** Journal of Chromatography A (2021) 462793.

Gemma Regan, Mary Moloney, Melissa Di Rocco, Padraig McLoughlin, Wesley Smyth, Steven Crooks, Christopher Elliott, Martin Danaher: **Development and validation of a rapid LC–MS/MS method for the confirmatory analysis of the bound residues of eight nitrofuran drugs in meat using microwave reaction.** Analytical and Bioanalytical Chemistry (2021) Volume 414, pages 1375–1388.

All EU-CHINA-SAFE publications >>>

Confidence building and trade facilitation

EU-China-Safe aims at building confidence in EU-China trade by improved understanding of consumer practices and regulatory frameworks, the latter by developing and demonstrating mutual recognition of laboratory standards and results. A virtual laboratory (RL2020) will be established to showcase new best practice, ensure harmonisation of laboratory procedures and to build confidence and mutual recognition of results. There will be a strong focus on exchanging best practices between the EU and China and will ensure that there is a full understanding of food safety and authenticity

requirements to support compliance of exporting companies with both the EU and Chinese requirements, in support of enhancing bilateral trade of food/agri-food commodities. Emphasis will be placed on reaching consistent laboratory testing regimes as well as food safety standards underpinned by robust risk assessment, with the aim of bolstering consumer confidence in both jurisdictions.

(i) **Building of consumer confidence:** The analysis of consumer views within Europe and in China is aiding the understanding of choices and responses to food incidents. EU-China-Safe is unique in the data that it captures with respect to Chinese views on a range of factors, including perceptions of risk in the food chain, views on the safety of selected domestically produced and imported products, willingness to pay for enhanced food safety, acceptance of new technologies, sources of trust for information, and preferred channels to receive information.

This task employed mixed methods research (stakeholder interviews, consumer focus groups and consumer surveys) to explore how best to build consumer confidence. Infant formula milk (IFM) and processed Chinese garlic were used as exemplar products to understand each export market (n=996 Chinese consumers and n=570 EU consumers, respectively). Chinese and EU consumer views on innovative food fraud strategies were further explored via online focus groups and informed the conclusions of the relevant study. Key recommendations to industry for the improved consumer communication of EU products to China were made

(ii) **Analysis of trade barriers:** The analysis of commodities related to food impediments between the EU and China (stemming from different food safety standards) will lead to the identification of mitigation measures to support the early identification and possible pro-active mitigation of such discrepancies.

Current cases of border rejections and disruptions in the flow of food products between the EU and China were reviewed and analysed.

Key industry and government stakeholders were consulted to enable the identification of priority areas where impediments to trade can be attributed to divergent food safety standards.

Global legislation and the scale of challenge in reaching the harmonisation of food safety standards was reviewed, with focus on legislation for aflatoxins in peanuts, to identify strategies promoting regulatory collaboration and thus trade, particularly between the EU and China.

A standard approach for early identification and mitigation of food trade impediments related to a discrepancy in food safety measures / standards was developed. A white paper on effective approaches for early identification and proactive mitigation of aflatoxins in peanuts as an important example for divergent food safety measures which can cause impediments to trade was produced.

(iii) **Development of an EU-China Laboratory Network: The virtual 'Reference Laboratory 2020' (RL2020)** linking EU and Chinese networks of laboratories, to showcase and demonstrate best practice and the state of the art in high quality food analysis, was established. This is the first attempt to develop such a concept over such a wide and complex network.

RL2020 is unique in having the capacity for staff and technicians to work on the same analytical processes and to produce results to the same quality standard. The exchange of methods and data for dioxins analysis has demonstrated the 'proof of concept' for the virtual laboratory. The work carried out to collate information on the partners capability for other methods, as well as quality control procedures will be used to develop and expand capability of the RL2020 where similar analytical instruments and data outputs allow, or where it can be converted to allow transfer between laboratories. This will allow data analysis for instrument outputs produced in one continent to be processed in another to demonstrate equivalency in process and quality standards. The overall aim of RL2020 is to allow a joint response to food control issues including incident response. This should have the potential to help solve food incidents quicker with less economic damage and will ultimately protect the consumer in terms of food safety.

- Knowledge transfer (two ways) of existing best practice between laboratories was tested. Questionnaires were developed and exchanged between key partners for environmental contaminants and for food contact materials. This was expanded to veterinary medicines and pesticides.
- Harmonisation of laboratory procedures aimed at building confidence and mutual recognition of results was supported. Details of methodology were exchanged for analytical methods initially in support of the development of RL2020, then for the transfer of methods between laboratories for scenarios on veterinary medicines and food contact materials.
- Development of consistent laboratory testing regimes and food safety standards was underpinned by robust risk assessment. European and Chinese regulations relevant to food control have been obtained and shared in the virtual laboratory.

- Similar instrumentation was obtained by European and Chinese partners with cooperation of instrument vendors in support of development of RL2020. A data sharing and storage platform has been established in support of the operation of RL2020. This was used in the validation of a method for dioxins.
- Past incidents as case studies were used to show how an integrated EU-China network could have improved the response to a crisis – laboratory analysis, communication and economic evaluation. A case study analysing economic cost and laboratory response in support of risk management actions was developed using the dioxins in Irish produce as an example. A second case study for melamine in Chinese infant formula, using a similar approach to that used for dioxins was also completed.
- Scenario planning for future food incidents was developed - response to a crisis - laboratory analysis, communication and estimating economic impact. Assessments of the utility of the virtual laboratory in dealing with a food safety incident and an economic analysis of how the virtual lab could impact trade by improving food safety through mutual recognition of data and standards and improve consumer trust were completed. This was supported by the use of two cases studies that were designed to reflect current issues. The first (biobased food contact materials) was chosen as a result of a large number of RASFF reports for these items following EU Commission action to enforce controls for bamboo items as they are not authorised. The second was chosen to be a more long standing situation linked to a method developed within EU-China-Safe where progress has been made to allow better monitoring and controls (nitrofurans in meat).

The **Virtual laboratory RL2020** will assist within the field of harmonising food control in terms of analytical response and knowledge, and sharing the information and methods.

Watch the video about EU-China-Safe activities of virtual 'Reference laboratory 2020' (RL2020)

The dioxins method validation webinar is available in the RL2020 database as a training resource.

The analysis of consumer attitudes and barriers to trade arising from food safety incidents will enable action to be taken to reassure the consumer and to identify actions that may remove barriers to trade.

Read the report: Report on (a) the results of qualitative stakeholder interviews (b) the food trade impediments between the EU and the PRC that can be attributed to differences in food safety measures, (c) the results of EU quantitative consumer survey

Read some of the EU-China-Safe papers:

Liran Christine Shan, Chenguang Li, Zhongyi Yu, Áine Regan, Ting Lu, Patrick Wall: **Consumer perceptions on the origin of infant formula: A survey with urban Chinese mothers.** Journal of Dairy Research (2021) 88(2), 226-237.

Peng Miao, Si Chen, Jing Li, Xiaofei Xie: **Decreasing consumers' risk perception of food additives by knowledge enhancement in China.** Food Quality and Preference (2020) Vol. 79:103781.

Julie L. Schiro, Liran Christine Shan, Mimi Tatlow-Golden, Chenguang Li, Patrick Wall: **#Healthy: smart digital food safety and nutrition communication strategies—a critical commentary.** npj Sci Food (2020) 4, 14.

All EU-CHINA-SAFE publications >>>

Dissemination, exploitation and training

EU-China-Safe aims at transferring knowledge, together with training, that is the key instrument for reinforcing cooperation and increasing the level of collaboration as well as enhancing synergy between the EU and China in the food safety area. It will support the working synergies to be found between on-going EC projects and will maximise impact delivery in terms of improving safety of food supply and increasing consumer confidence in imported/exported agri-food products.

Training program:

TRAINING PROGRAM for consortium members, external scientists and stakeholders was developed in collaboration with EU and China partners, including e-learning tools to support worldwide knowledge dissemination to the community not involved directly in the training program.

The training program was developed to strengthen links and facilitate communication between EU and China partners within EU-China laboratory network. For the efficient knowledge transfer on developed technologies and other information generated within the project framework, comprehensive training program was developed, consisting of

establishing a training network, young scientist's mobility program, organisation a series of the workshops and other events to disseminate technological developments and build rapport between Chinese and European researchers, representatives of academia, food authorities, food industry and other stakeholders. In cooperation with the RL2020 specific information was provided to laboratories of EU-China laboratory network and other potential stakeholders.

Various short-term and long-term training and education activities at different levels were running within the EU-China-Safe project training program.

(i) **Development of training and scientist mobility program** targeted at students, young scientists and staff employing various tools with the aim to help in their capacity building and assisting in the transfer of knowledge:

Materials from these trainings

(ii) **Massive Online Open Courses** to support worldwide knowledge dissemination to the community not involved directly in the training program:

- Introduction to Food Science
- Revolutionising the Food Chain with Technology
- Farm to Fork: Sustainable food production in a changing environment
- Understanding Food Supply Chains in a Time of Crisis

(iii) **Series of workshops focused on various aspects of food safety and authenticity,** aimed at knowledge transfer to the community of professionals, associations, industry and other potential end-users:

Materials from these workshops

(iv) In addition to the planned training program, **series of twinning activities** in response to the tasks of individual EU-China-Safe activities have been organised to support knowledge transfer on developed methodologies between EU and China project partners.

Series of scientific papers published by EU-China-Safe consortium:

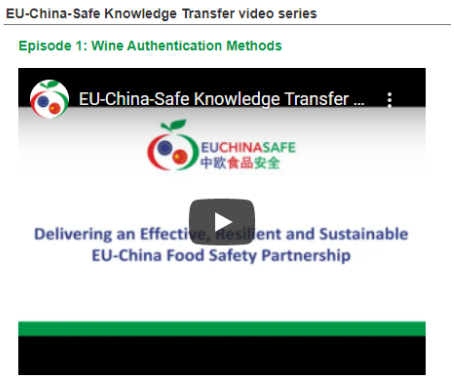
Look at the list of ALL SCIENTIFIC PAPERS HERE

OPEN ACCESS to data:

In order to make research data publicly available after the project lifetime, an EU-China-Safe community was created at Zenodo.org, a catch-all repository: https://zenodo.org/communities/eu-china-safe/about/.

Dissemination activities:

(i) **Watch our series of knowledge transfer videos summarising selection of major project outputs!**



(ii) **Latest events co-organised by the EU-China-Safe project:**

China International Food Safety & Quality Conference (CIFSQ 2021), session on EU-China Safe: China Intergovernmental Cooperation on S&T Innovation / EU Horizon 2020 Food, Agriculture and Biotechnology Flagship Project (27-28 October, 2021, Beijing, China, hybrid event)

Read report about this event, watch presentations

Virtual event highlighting current Trends & Views on RECENT ADVANCES IN FOOD ANALYSIS (RAFA 2021) (3-4 November 2021, virtual event)

Watch presentations at YOUKU

EU-China-Safe Final Meeting and Stakeholder Engagement (23 February 2022, virtual event)

Read the list of exemplars of the project outputs, watch the presentations

At the end of the project, project coordinators QUB and CFSA in collaboration with EU and Chinese project consortium organised final meeting showcasing selected significant project outputs. The aim of this event was focus on the breadth and impact the project has delivered to date and will in the future.

All these activities enabled **excellent visibility of the EU-China-Safe** project. At all mentioned events / activities, various types of audience from many countries of Europe, China and worldwide were impacted, including scientific community, industry representatives, trade organisations, standards organisations, governmental bodies, policy makers, EU bodies, control bodies, academia / students, media and also general public.

Do you want to receive information about follow-up EU-China-Safe activities?

Please **Sign up for EU-China-Safe stakeholder's database** here.

We hope you have found this e-Newsletter interesting and informative. We would welcome your views on any of the issues covered. Please email at euchinasafe@euchinasafe.eu. Please feel free to distribute this EU-China-Safe e-Newsletter to other interested parties.

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