

# 2017 APEC Capacity Building Workshop on Food Losses and Waste Reduction for a Sustainable APEC Food System

Agricultural Technical Cooperation Working Group (ATCWG) Policy Partnership of Food Security (PPFS)

September 2017

# APEC Multi-Year Project: "Strengthening Public-Private Partnership to Reduce Food Losses in the Supply Chain" (M SCE 02 2013A)

#### Prepared by

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# 2017 APEC Capacity Building Workshop on Food Losses and Waste Reduction for a Sustainable APEC Food System (APEC MYP SCE 02 2013A)

## (Cover Page Format)

Project Number	MYP SCE 02 2013A
Project Title	Strengthening Public-Private Partnership to
	Reduce Food Losses in the Supply Chain
Proposing Economy	Chinese Taipei
Seminar Title	APEC Capacity Building Workshop on Food
	Losses and Waste Reduction for a Sustainable
	APEC Food System
Seminar Location	Food Security Week, Can Tho, Vietnam
Seminar Date	August 19, 2017

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## I. Preface

APEC has taken a leading step to reduce food loss and waste by supporting a multiplestage research and policy advising project. Chinese Taipei has been implementing the APEC Multi-Year Project (MYP SCE 02 2013A) on "Strengthening Public-Private Partnership to Reduce Food Losses in the Supply Chain" since 2013. Project implementation has so far established a network of experts on food loss and waste, a technical team to gather and maintain pertinent data and perform analyses, and consultations on food crops in 2013, vegetables and fruits in 2014, fishery and livestock products in 2015, as well as retailers and consumers waste in 2016. In 2017, the project will reach its final phase by synthesizing all previous progress and information collected into policy recommendations and action plans.

This workshop will bring together experts from government, academic communities, food industry sector, food bank operators, NPOs and NGOs to discuss priorities and potential actions to move the FLW reduction and prevention agenda forward in the APEC region. This one-day capacity building seeks to:

- Introduce practical guidelines for food losses and waste measurement, reporting, as well as reduction with pilot actions in APEC member economies;
- Highlight a range of "No-Regret" tools and strategies for encouraging publicprivate partnerships towards more sustainable food losses and waste reduction practices;
- Collaborate with other APEC food-security-related initiatives and cross-fora projects in the APEC region.

Outcomes will be delivered to the ATCWG and PPFS at the APEC 2017 Food Security Week, August 20~25.

## II. Program

Date: August 19 (Saturday), 2017

Venue: Ninh Kieu B (3F), Muong Thanh Hotel, Can Tho City, Viet Nam

Host: Council of Agriculture, Chinese Taipei

Co-Host: Ministry of Agriculture and Rural Development, Viet Nam

08:00-08:30	Registration
08:30-08:50	Welcome Remarks
	- Dr. Su-San Chang (Director General, Pingtung Agricultural Biotechnology Park,
	Council of Agriculture, Chinese Taipei)
	-Mr. Tran Kim Long (Director General, Dept. of International Cooperation, Ministry
	of Agriculture and Rural Development, Viet Nam)
	- Dr. Ha Thanh Toan (Rector, Can Tho University, Viet Nam)
	-Dr. Xifeng Gong (APEC ATCWG Interim Lead Shepherd, Director General, Dept. of
	International Cooperation, Chinese Academy of Agricultural Sciences, P.R. China)
08:50-09:00	Group Photo
09:00-10:00	Session 1: Practical Guidelines for Quantification and Reduction of Food Losses
	and Waste
	1. Innovation in Measuring Food Losses and Waste along the Value Chain
	Dr. Maximo Torero (World Bank)
	2. Review of APEC Action Plans for Reducing Food Losses and Waste: Summary of
	Expert Consultation and Survey in Taipei Workshop
	Dr. Ching-Cheng Chang (Academia Sinica, Chinese Taipei)
	Chair: Dr. Su-San Chang (Council of Agriculture, Chinese Taipei)
10:00-10:20	Coffee Break
10:20-12:00	Session 2: Experience Sharing and Private Sector Solutions to Food Waste
	1. Sustainable Food Waste Programs in Postharvest Storage and Handling
	Mr. Eric Prieur (Carrier Refrigeration Co.)
	2. Sustainable Food Waste Programs in Food Processing and Manufacturing
	Mr. Jean-Pierre Dawance (Nestlé Vietnam)
	3. Sustainable Food Waste Programs in Retail and Food Banks
	Mr. Winson Wu (Carrefour)
	4. "Think Eat Save" and UNEP's Regional Food Waste Prevention Program
	Ms. Clementine O'Connor (Think Eat Save Program Coordinator)
	Chair: Dr. Miranda Mirosa (University of Otago, New Zealand)
12:00-13:40	Lunch
13:40-15:00	Session 3: Review of APEC Projects on Reducing Food Losses and Waste
	1. The Major Outcomes of Our APEC project: "Enhancing Connectivity of APEC
	Grain Standards & Small Farmer and SMEs' Food Loss-Reduction Technology
	and Experience"

	Dr. Sun Hui (Grain Science Academy State Administration of Grain, PRC)	
	2 Summary Report of "High Level Public-Private Forum on Cold Chain to	
	Strengthen Agriculture & Food's Global Value Chain"	
	Ms Miki Okumura (Ministry of Agriculture Forestry and Fisheries Janan)	
	<ul> <li>Ms. Mixi Okumuru (Ministry of Agriculture, Porestry and Pisneries, Jupan)</li> <li>Summery Deport of "Innovative Technologies for Deducing Destherwest Losses"</li> </ul>	
	5. Summary Report of Innovative rechnologies for Reducing Postnarvest Losses	
	01 US-AI IARI	
	4. Progress Report of APEC Services Competitiveness Roadmap of APEC Policy Support Unit (PSU)	
	<b>Chair</b> : Dr. Amelita Rodriguez Salvador (PhilMech, The Philippines)	
15:00-15:20	Coffee Break	
15:20-17:00	Session 4: Panel Discussion on "How to Raise Awareness and Move Forward to	
	SDG 12.3: Key Messages for Policy Making and Action Plan"	
	Main Issues:	
	- Explore the perspective that APEC should take on food losses and waste (FLW)	
	reduction for a Sustainable APEC Food System:	
	- Elaborate on practical guidelines for FLW measurement, reporting and performance	
	evaluation for APEC MEs:	
	- Discuss how best practices and benefits of FLW reduction can be shared among	
	APEC economies and stakeholders along the food chain:	
	- Explore the way to raise the awareness of cherishing and saving food in APEC.	
	- On FLW reduction goal should APEC advance beyond the MDGs towards SDG	
	12 39	
	- Discuss the risk/opportunities and capacity building needs to enable technical and	
	social innovations in the public and private domain:	
	- Explore the way PDES/ATCWG may work with other regional/international for a to	
	reach the desired target	
	Ponolicte:	
	- Dr. Tony Shih-Hsun Hsu (National Taiwan University Chinese Taipei)	
	- Dr. Amelita Rodriguez Salvador (PhilMech, The Philippines)	
	- Dr. Nauven Do Anh Tuan (IPSARD Viet Nam)	
	- Dr. Ngayen Do Thin Tuan (IT SIND), viet Nam)	
	Dr. Rao, Ji Chen (National Taiwan University, Viet Nam)	
	Dr. Miranda Mirosa (University of Otago, New Zealand)	
	- Dr. Miranaa Mirosa (Oniversity of Olago, New Zealana) Moderator: Dr. Tony, Shih Hsun Hsu (National Taiwan University, Chinasa Tainai)	
17.00 17.20	Wron Un Sossion	
17.00-17.20	Virap-Op Session	
	Dr. China Chana Chana (Academia Sinica, Chinasa Tainai)	
	Dr. Chang-Chang (Acaaemia Sinica, Chinese Taipei)	
	2. Closing Remarks	
	Dr. Su-San Chang (Council of Agriculture, Chinese Taipei)	

## **III. Profile of Speakers**

Session 1: Practical Guidelines for Quantification and Reduction of Food Losses and Waste

#### 1. Dr. Maximo Torero



Executive Director World Bank Email: mtorero@worldbank.org

Dr. Maximo Torero is the World Bank Group Executive Director for Argentina, Bolivia, Chile Paraguay, Peru and Uruguay since November 2016. Prior to joining the Bank, Dr. Torero led the Division of the Markets, Trade, and Institutions at the International Food Policy Research Institute (IFPRI). His major research work lies mostly in analyzing poverty, inequality, importance of geography and assets (private or public) in explaining poverty, and in policies oriented towards poverty alleviation based on the role played by infrastructure, institutions, and on how technological breakthroughs (or discontinuities) can improve the welfare of households and small farmers. His experience encompasses Latin America, Sub-Saharan Africa, and Asia.

#### 2. Dr. Ching-Cheng Chang



Research Fellow/ Professor Institute of Economics, Academia Sinica; Department of Agricultural Economics, National Taiwan University Email: emily@econ.sinica.edu.tw

Dr. Ching-Cheng Chang is a Research Fellow in the Institute of Economics at Academia Sinica and is a Professor in the Department of Agricultural Economics at National Taiwan University where she teaches linear programming, agricultural sector modeling, and modeling applications. She also directs the Socioeconomic Department of the APEC Research Center of Typhoon and Society. Her research interests include efficiency measurement, dynamic optimization, climate change impacts on labor, and trade policy and market structure of the international commodities market. Dr. Chang holds a PhD in Agricultural Economics from the Pennsylvania State University.

Session 2: Experience Sharing and Private Sector Solutions to Food Waste

#### 3. Mr. Eric Prieur



Cold Chain Sustainability Director Carrier Transicold & Refrigeration Systems Email: Eric.PRIEUR@carrier.utc.com

Mr. Eric Prieur serves as Cold Chain Sustainability Director at Carrier Transicold & Refrigeration Systems, providing refrigeration solutions for cold storage, transport & retail applications. In his mission to drive the "Securing the Future of Food" program, his responsibilities include the cold chain expansion in developing countries and the organization of the annual World Cold Chain Summit to reduce food loss. Carrier is a part of UTC Climate, Controls & Security and a unit of United Technologies Corp. Eric holds a M. Sc. in industrial engineering from Grenoble INP and an MBA from INSEAD.

#### 4. Mr. Jean-Pierre Dawance



Technical Director Nestlé Vietnam Email: Jean-Pierre.Dawance@vn.nestle.com

Mr. Jean-Pierre Dawance is currently Technical Director for Ensuring Supply through factories and co-manufacturer in Vietnam. Previously Technical Manager for Nestle in Maghreb, Operations Manager for Nestlé Waters in China, based in Shanghai responsible for managing the production sites and ensuring supply through our factories and co-packers hence managing the people, procurement, manufacturing, industrial performance continuous improvement/operation excellence, QA, food safety and compliance, water resources, water treatments, maintenance, safety health and environment, industrial relations, new product development, investments and due diligence / integration processes.

#### 5. Mr. Winson Wu



Executive Chief/ Director Carrefour Foundation/ CSR Email: winson\_wu@carrefour.com

Mr. Winson Wu is an Executive Chief, Taiwan Carrefour Cultural and Educational Foundation. Mr. Wu exercises his profession from operation, public affairs and human recourses to corporate social responsibility (CSR). He leads Taiwan Carrefour Foundation to launch the "Carrefour food project", which laid the foundation of the Association of Taiwan Foodbanks (ATF) establishment, made Carrefour Taiwan the first retail brand to start the daily un-sold food donation to NGOs. On top of that, he continues to help the social enterprises to develop the anti-waste product and small farmer on friendly agriculture. On the anti-waste subject, he is constant invited to share Taiwan experience in Asian or Global Food Bank network. He brings advanced anti-waste knowledge to advocate in media & forum for local development of anti-waste subject. Multiple CSR award winner regarding food program.

#### 6. Ms. Clementine O'Connor



Think Eat Save Initiatives Coordinator Sustainable Food Systems Consultant Email: clementinebeatrice@gmail.com

Ms. Clementine O'Connor has recently joined UNEP's Sustainable Food Systems team to help build global strategy for food waste prevention via the Think.Eat.Save initiative. Her role will focus on launching and piloting UNEP's new Guidance document on food waste prevention strategy for businesses and households. She is on sabbatical from BIO by Deloitte, where she leads sustainable food consultancy, most recently identifying legal barriers to the redistribution of food surplus in the EU.

#### Session 3: Review of APEC Projects on Reducing Food Losses and Waste

#### 7. Dr. SUN Hui



Researcher Grain Science Academy, State Administration of Grain Email: sh@chinagrain.org

Dr. SUN Hui is Professor of Academy of State Administration of Grain (ASAG), received her Ph.D. degree in Plant Genetics and Breeding from China Agricultural University in 1998. Following graduation, she has been working in ASAG on grain quality and standardization. Her research center around grain quality and the related national & international standard. She was rewarded ICC (International Association for Cereal Science and Technology) Harold Perten Award in 2012. She succeeded to lead 1 ISO standard and 20 Chinese national standards released and 56 publications by 2016. She is also the Vice-president of Fermented Flour Based Food Sub-association of CCOA and member of the Expert Panel of Wheat Sub-committee of Crop Variety Approval Committee of Beijing.

#### 8. Ms. Miki Okumura



Technical Official of International Organizations Division Department of International Affairs, Ministry of Agriculture, Forestry and Fisheries Email: miki\_okumura700@maff.go.jp

Ms. Miki Okumura is Technical officer, International Organizations Division, International Affairs Department, Minister's Secretariat, MAFF from Apr, 2017. She worked at Livestock Industry Policy Planning Division, Livestock Industry Department, Agricultural Production Bureau, MAFF from Apr, 2015 to Mar, 2017. She obtained bachelor of Veterinary Medicine, the University of Tokyo in 2015. Session 4: Panel Discussion on "How to Raise Awareness and Move Forward to SDG 12.3: Key Messages for Policy Making and Action Plan"

9. Dr. Tony Shih-Hsun Hsu



Professor Department of Agricultural Economics, National Taiwan University Email: m577tony@gmail.com

Dr. Tony Shih-Hsun Hsu is Professor, Department of Agricultural Economics, National Taiwan University. Dr. Hsu graduated from Texas A&M University, USA, 1991. He was Chair, Department of Agricultural Economics, National

Taiwan University, 2005-2011. He was selected as Research Fellow, Global Trade Analysis Project (GTAP), Purdue University, USA, 2003. He was serving as Member of the Editorial Advisory Board, Journal of Agricultural Economics, International Association of Agricultural Economists (IAAE), 1998-2003. He is President, Taiwan Association of Input-Output Studies (TAIOS) and Co-PI, SUSFANS (an EU HORIZON 2020 Project). He is now member of Board of Directors, International Cooperation Development Fund (ICDF). His research interests include International Trade, Agricultural Development and Policy, Applied General Equilibrium Analysis, Agricultural and Resource Economics.

#### 10. Dr. Amelita Rodriguez Salvador



Supervising Science Research Specialist Department of Agriculture - Philippine Center for Postharvest Development and Mechanization (PHilMech) Email: amyrod@yahoo.com

Dr. Amelita Rodriguez Salvador is a research specialist at the Department of Agriculture in the Philippines where she supervises Socioeconomic and Policy Research focusing on the loss assessment of grains. Her research division works on various agricultural and supply chain analyses including loss assessments of high value crops, postharvest systems development, and organizational management and rural development.

#### 11. Dr. Nguyen Do Anh Tuan



Director General Institute of Policy and Strategy for Agriculture and Rural Development, Ministry of Agriculture and Rural Development Email: ndatuan@ipsard.gov.vn

Dr. Nguyen Do Anh Tuan has nearly 10 years' experience in Institutes for Policy Studies, particularly policies and strategies for Agriculture and Rural Development. He is author and co-author of numerous articles, scientific papers, published in many national and international newspapers. His research interest include: analysis of agricultural market, agricultural policy development, innovation in agriculture, economic restructuring, food security, land policy, etc.

#### 12. Dr. Ngo Thi Thanh Truc



Deputy Head of Dept. Dept. Environmental and Resource Economics, College of Economics, Can Tho University Email: ntttru@ctu.edu.vn

Dr. Ngo Thi Thanh Truc is the deputy head of department of Environmental and Resource Economics, College of Economics in Can Tho University. She is an environmental economist. She has conducted research on biomass utilization in agriculture in the Mekong Delta, Vietnam such as rice straw and rice husk, biogas. She has also involved in the program of Climate Change and Food Security as a local socio-economic researcher. She got PhD in Environmental Science and cognate in Natural Resource Economics in 2011 at the University of the Philippines Los Boños, Philippines.

#### 13. Dr. Bao-Ji Chen



Professor Department of Animal Science and Technology, National Taiwan University Email: bjchen@ntu.edu.tw

Dr. Bao-Ji Chen is Professor, Department of Animal Science and Technology, National Taiwan University. Dr. Chen served as the Minister of the Council of Agriculture of the Executive Yuan from 6 February 2012 to 31 January 2016. He obtained his bachelor's and master's degrees in animal husbandry from National Taiwan University in 1975 and 1977, respectively. He then obtained his doctoral degree in animal nutrition from Cornell University in the United States in 1989.

#### 14. Dr. Miranda Mirosa



Senior Lecturer Department of Food Science, University of Otago Email: miranda.mirosa@otago.ac.nz

Dr. Miranda Mirosa is the Director for the Consumer Food Science Programme and a Senior Lecturer in the Department of Food Science, University of Otago. In 2015, Dr. Mirosa led a grant for developing NZ/China collaborations in food safety and security science. As Principle Investigator, she led a team of 13 NZ scientists from 7 different institutes to China to partake in a conference and industry visits. Dr. Mirosa currently holds a NZ/China Postharvest Loss and Food Waste Research Fellowship, funded by the NZ Ministry for Primary Industries – a programme aiming to enhance business-research-government partnerships through commercially meaningful research, complement joint research programmes under the China-NZ Food Safety and Security Science Roadmap, and support the APEC Food Security and Free Trade Area Asia Pacific work.

#### **IV. Minutes by Sessions**

Session 1:

Practical Guidelines for Quantification and Reduction of Food Losses and Waste

# 1.1

Innovation in Measuring Food Losses and Waste along the Value Chain Dr. Maximo Torero (World Bank)

Dr. Torero presented the importance of food loss and waste (FLW) both at the production and consumer level, and also presented how different studies have reported different measurement depending on the commodity type and commodity level. In addition, he mentioned that from a policy perspective, FLW reduction should be taken as a priority because it is a global problem.

Based on a report from the World Resources Institute (WRI), Dr. Torero showed that food losses in developing economies occur mostly at the production and handling and storage stages, while in more developed economies the losses occur mostly in the consumption stage. In fact, there is a high correlation, as shown in the presentation, between the areas where today's hungry people live and the place where high food losses occur.

In terms of sustainability, reducing food loss and waste has a bigger impact for food security compared to increasing food productivity. However, other factors such as access to production inputs, feeding programs, food stamps, and special distribution networks are important to feed all people around the world.

Dr. Torero emphasized that FLW creates externalities to the environment. For example, the resources used in production, such as water and soil, are not being fully utilized when food is lost or wasted. Moreover, when food is waste there is an environmental cost or footprint of the disposal of food. Similarly, greenhouse gas emissions impact the environment across production and marketing systems.

Macro and micro approach for the measurement of FLW present both pros and cons. For the macro approach, the data collection is extensive and does not specifically point out where the loss occurs. On the contrary, the micro approach is detailed oriented which makes it very costly and time consuming and its results cannot be generalized and compared across different commodities. Macro, micro, and meso level approach are the three main approaches for the measurement of FLW, they all have advantages and disadvantages, therefore, decision makers should study carefully these approaches.

The definition of food loss and waste is fundamental for the measurement. Nevertheless, choosing the correct definition is extremely complex. As a result, Dr. Torero proposed that the measurement method for FLW must look at the economic, quantity and quality loss of food. Past studies have reported different measures for the same food commodity in a same country which makes unlikely that policies can be formulated from such large variation in measures.

Dr. Torero proposed methodology for the measurement of FLW takes into account the

following:

- 1. A value chain concept. Farmers, middlemen, wholesale buyers and processors included in the measurement and the interaction among them are all related to FLW.
- 2. The physical quantity and quality losses.
- 3. Reduction of the measurement error is conducted through 3 methods.

A lot of the existing data for food loss and waste is found in the aggregate form commonly taken from a self-reported method. Dr. Torero proposes 3 additional methods namely:

- 1. Category method which builds on the "Visual Scale Method" (Compton and Sherington, 1999) to rapidly estimate quantitative and qualitative grain loss.
- 2. Attribute method which evaluates visual, tactile, and olfactory characteristics of food.
- 3. Price method which assumes that a decrease in price, all else equal, is thus a proxy for deterioration in quality.

The concept of stochastic frontier was proposed to measure the potential production of food. In Vietnam, for example, household level data, data of inputs and outputs, and regional level GIS data were used to identify the agricultural potential and efficiency. It was shown that the agricultural potential of Vietnam is higher in the South than in the North. However, agricultural efficiency is higher in the middle and northern areas of Vietnam, while in the South the agricultural efficiency is lower. The gap in the agricultural efficiency of southern Vietnam can be reduced through efforts to reduce losses at the production, storage and handling stages and through the adoption of mechanization and more advanced technologies.

Dr. Torero concluded saying that FLW reduction can be achieved once a comprehensive measurement strategy and concrete targets at the regional level have been adopted. Moreover, the SDG goal 12.3 is an aspirational goal, thus government, private sector and academia in the APEC region should focus their efforts on the reduction of FLW which is a global problem and threatens food security and sustainability.

#### 1.2

# **Review of APEC Action Plans for Reducing Food Losses and Waste: Summary of Expert Consultation and Survey in Taipei Workshop**

Dr. Ching-Cheng Chang (Academia Sinica, Chinese Taipei)

Dr. Chang briefly introduced the foundation background of the APEC multi-year project which resides in the necessity to establish a comprehensive food system-based food security environment in APEC. The Niigata Declaration in 2010, Policy Partnership on Food Security [PPFS] in 2011, and the Kazan Declaration in 2012 identified that food losses and waste is a big challenge to achieve major food security in APEC by 2020. In 2014, after the APEC Ministerial Meeting in People's Republic of China, an APEC Food Security Roadmap Towards 2020 was elaborated. In this roadmap APEC economies agreed to strive to reduce food loss and waste (FLW) by 10% compared with the 2011-2012 levels by 2020 in the Asia-Pacific economies.

The APEC Action Plan for Reducing Food Loss and Waste, endorsed in the PPFS 2014 plenary meeting, states that FLW reduction is equal to increasing food supply and saving limited resources. Key actions of this plan include multi-year projects on reducing food loss within all 21 APEC economies, capacity-building activities, and support and harmonization of the activities on reducing FLW with emphasis on strengthening Public-Private Partnerships.

The Multi-Year Project "Strengthening Public-Private Partnership to Reduce Food Losses in the Supply Chain" involves a 3-pillars approach:

- 1. Food Loss and Waste Assessment Methodologies: It is necessary to consolidate the definition and measurement methods.
- 2. Toolkits and Best Practices: It serves to identify causes and solutions of FLW. Moreover, these solutions may include Public-Private Partnerships which can all be disseminated through the internet or information platform.
- 3. Capacity Building Activities: It promotes the exchange of experiences among experts and stakeholders in the food supply chain.

The 3 pillars have achieved the following progress:

1. Food Loss and Waste Assessment Methodologies: A top-down approach following the FAO definition and Mass Flow Model of FAO may serve as the foundation of a common definition and measurement. The proposed top-down approach is dependent on the local area, commodity type, and stage of development of the economy. In addition, each economy can validate this measurement method and build their own data collection system. Similarly, economies may evaluate if this definition goes in accordance to their policy recommendation needs.

2. Toolkits and Best Practices: A value chain approach must be adapted to all toolkits and best practices. This value chain integrates all different stages from the development of new varieties, production, postharvest, marketing, and consumers.

3. Capacity Building Activities: Several capacity building seminars to reduce FLW have been held during the period 2013 to 2017. In each year a specific sector of the agricultural production value chain was chosen: Food grains (2013), fruits and vegetables (2014), fisheries and livestock (2015), retail and consumption (2016), and consolidation and dissemination of all previous information (2017).

One of the main messages from the June 2016 Expert Consultation for FLW reduction held in Chinese Taipei is that although there is not specific food loss data collected locally for APEC economies, non-regret solutions, also knowns as win-win solutions, should be adapted to the APEC economies and thus decision maker may bring benefits for the society.

A cost-benefit assessment of the non-regret solutions applied for APEC to reducing FLW by 10% shows that the net annual benefit is about US\$ 55 billion and the cost is about US\$ 9 billion per year. The social and business opportunities are remarkably high in this assessment too, which may yield about US\$ 10 billion in benefits.

Dr. Chang reported preliminary results from a survey conducted to APEC economies in

order to identify existing initiatives/actions/programs to reduce FLW.

A total of 15 economies answered the survey. Following the International Monetary Fund (IMF) definition, 6 of those economies are developed economies and 9 are developing economies. On average each economy has 4.3 programs or initiatives to reduce FLW regardless of the stage of development of the economy. However, the composition of programs is different for developing and developed economies. For instance, the number of programs focused on the production and consumption side is nearly equal in developed economies, on the contrary, programs are focused mostly on the production side in developing economies. Thus, this reflects the need for infrastructure development and technical needs of developing economies.

Respondents to the survey provided the following general recommendations:

- Tax benefits should be provided to food donors.
- Provide soft loan or low interest loan for infrastructure and equipment.
- Define FLW, measurement method and goal.
- Establish public-private entity and attract private investments in new technologies.
- Apply traceability system widely.
- Organize seminars or training activities for all actors along the food supply chain.

Dr. Chang highlighted that next steps for the multi-year project is to have a high-level policy dialogue, build partnerships, and disseminate knowledge through the website of the project (http://apec-flows.ntu.edu.tw/)

In terms of partnership building, public awareness campaigns and information of saving and cherishing food and natural resources are needed. Additionally, information exchange from experts, ATC working group, PPFS, and delegates from APEC economies can all enhance further partnership building.

For next year the following deliverables are being prepared:

- **Final Report** with policy recommendation and action plans
- Practical Guidebook with measurements, solutions, and policy guidelines.
- **Information Platform** (It has been already initiated as APEC-FLOWS website or APEC Food **Lo**sses and **W**aste **S**ystem).

#### Session 2: Experience Sharing and Private Sector Solutions to Food Waste

#### 2.1

#### Sustainable Food Waste Programs in Postharvest Storage and Handling

Mr. Eric Prieur (Carrier Refrigeration Co.)

Mr. Prieur briefly introduce the Company Carrier as a leading company in the air conditioning industry and also as a provider of solutions for keeping the cold chain of products from farm to fork. Carrier does not own any transportation vehicles or storage facilities, but rather provides cooling equipment with the help of a team made of engineers, researchers, and other professionals.

Carrier helps its customers to keep their produce longer, thus prevention of FLW is one of the key areas in which Carrier works. When producers request information about the potential FLW reduction from adopting Carrier equipment, Mr. Prieur emphasized that it is important to assess the production unit and visit the farm personally to calculate if the adoption of a cold chain will yield additional benefits to the costumers.

A 2-minute video presented a cold chain field study on the citrus fruit Kinnow. This field study narrated the experience of Carrier in India where they assessed Kinnow production and developed a cold chain which preserves the quality of the fruit during transport in the hot summer season of India and thus reduces wastage and associated carbon emissions. The government of India witnessed the positive outcomes of this Carrier project and, therefore, has started planning further support to producers and farmers associations so that they can also establish similar cold chains for the transport of fruits from the production sites to markets.

From the Kinnow project in India, Carrier calculated that food loss was reduced by 76% and carbon emissions by 16%. While Carrier was in charge of conducting the study and creating communication tools to engage farmers and government authorities, farmers themselves have to invest in the technology in order to realize the benefits from the cold chain.

Mr. Prieur introduced a 5-step methodology to develop a cold chain which are:

- 1. Check storage time with refrigeration: In other words analyze for how long you can store your product before it is consumed.
- 2. Find out new market reach: This involves the location and time in which your product reaches the market and the price/value it will receive depending on these factors.
- 3. Inventory existing cold chain equipment: In some cases farmers may not even notice that cooling technology can provide benefits and during this phase some knowledge sharing may be involved.
- 4. Calculate profitability to fill the gap: It is possible that certain fruits do not yield profit from the investment in a cold chain because their market value is too low, therefore, a transparent analysis of the profitability is important before establishing a cold chain.
- 5. Build cold chain from farm to fork: Infrastructure, logistics and additional

#### services.

Carrier was invited to the International conference on agricultural value chain for international market integration & pilot model in Tay Ninh province, Vietnam on January 2017. The government in Vietnam is highly interested in assessing crops which may have the potential to yield benefits in terms of profitability and/or food waste reduction once a cold chain has been set up.

In the concluding part, Mr. Prieur presented the four pillars that Carrier uses to respond to the need of reducing FLW and improving cold chains for different valuable crops. The pillars are Technology, Education, Partnership, and Research.

#### 2.2

#### Sustainable Food Waste Programs in Food Processing and Manufacturing Mr. Jean-Pierre Dawance (Nestlé Vietnam)

Mr. Dawance reinforced the view that FLW is a global problem, and Nestlé as one of the world's biggest food companies is committed to contribute to FLW reduction and sustainability along the food value chain.

Creating a shared value is one of the goals of Nestlé's Corporate Social Responsibility. This value is for shareholders and society and may be distributed along the entire value chain.

Mr. Dawance expressed that similarly to what Dr. Torero and Dr. Chang have presented, Nestlé also considers measurement a need in order to improve their practices. They measure internally and through their measurements they are able to compare to their peers or even competitors. Mr. Dawance pointed out that having a common agreement for measuring among entities could facilitate the benchmarking of practices and create positive benefits for all.

Nestlé is committed to environmentally sustainable business practices and that is why they are focus on a set of targets to be achieved by 2020. For instance, they aim to achieve zero waste for disposal at their sites.

NESCAFE (one of Nestlé's products) was created in 1938 as a solution to prevent the disposal of Brazil's overproduction of coffee. At that time, coffee was being used as a fuel for steam locomotives; however, with the invention of NESCAFE the coffee can be preserved. Nestlé transform more than 14 million tons of perishable raw material into food products every year.

Besides the efforts Nestlé is doing to prevent wastage, they are also working on preharvest losses initiatives through providing improved plant varieties to producers. In Vietnam, for example, they distributed 4 million coffee plantlets (small coffee trees) which are resistant to pests so there is no need to use pesticide for these trees.

In Pakistan, Nestlé has helped milk producers set up chilling equipment for their production. The objective is that farmers can find a chilling center near from their farm and thus preserve the quality of the milk. As a result, only 1.4% milk losses occurs in

Pakistan which is much lower than 15 to 19% average of other countries.

In Mexico, Nestlé built a milk powder factory in which for every 100 liters of fresh milk that enters the factory, 13% is transformed into milk powder and the remaining is water. This water is carefully managed to re-enter the factory in order to meet the needs for tap water usage, making a self-sustainable production.

Mr. Dawance emphasized that proper packaging is also essential for preventing food waste. The optimum pack design must meet certain criteria which may take into account environmental impact and amount of packaging.

In Vietnam, Nestlé buys around <sup>1</sup>/<sub>4</sub> of the local green coffee production. From the processing of this coffee Nestlé obtain coffee ground as a by-product. This coffee ground is then dried, burnt and used to generate energy which now accounts for 65% of the energy used in this factory. In addition, Nestlé has established partnerships with other businesses that deal with the ashes from the burning of coffee grounds. This example demonstrates the commitment of Nestlé to contribute to the reduction of GHG emissions and to advance toward more sustainable production systems.

Mr. Dawance remarked the importance to engage all actors in the value chain in order to reduce FLW. He mentioned that Nestlé works closely in the distribution part with retailers such as Carrefour so as to meet demand and prevent waste. Similarly, they engage consumers through mobile applications in which they offer tips or recipes to reuse food that otherwise may have become waste. Finally, he acknowledge the necessity for all stakeholders to work together to reduce FLW and encourage the audience to search Nestlé website where they report on FLW reduction.

#### 2.3 Sustainable Food Waste Programs in Retail and Food Banks *Mr. Winson Wu* (*Carrefour*)

In Carrefour Taiwan, in the year 2016 for every 100 NTD of sales there is 0.53 NTD of loss. Food accounts for  $65 \sim 70\%$  of the total sales of Carrefour Taiwan. Therefore, around 70% of the loss is food and around 50% is fresh food.

In order to reduce food waste Carrefour has designed special discount areas inside their stores where they offer products with small defects or short expiry date. However, at the end of the day there are many products which are not sellable but still edible.

Carrefour identified a model where there is a need for linking food donors to beneficiaries. A particular important step is to build partnerships that make sure that food donations reach people in need in a timely and safe manner.

Carrefour works with the Alliance of Taiwan Food Banks (ATF) to redistribute the food which is eatable but not sellable. There are 100 Carrefour stores in Taiwan, and they work with several food banks but always make sure that the driving distance between the food bank and the Carrefour store is not more than 30 minutes.

Food safety is often seen as a barrier to establish food donations. Nevertheless, as Mr. Wu mentioned, Carrefour believes that food safety is manageable through training and

procedures. Therefore, the personnel involved in the sorting of food for donations receive previous training to make sure that donations are only composed of food that is safe to eat. In addition, through their partnership with food banks, Carrefour has established a procedure in which the NGOs pick up the donations from the gate of Carrefour's stores and also inspect the quality of the food.

Mr. Wu emphasized the important of measurement and recording the items donated every day. An IT system traces donation amount by store for data analysis in Carrefour.

A website was designed by Carrefour in order to connect more food donors such as street food vendors or traditional markets to food banks in Taiwan.

Carrefour advocates for food waste reduction and food donations. Mr. Wu highlighted that they want to let the civil society know about the importance of these topics, and with the support of the media they can reach more people and engage other stakeholders. As a result, other NGOs and enterprise started initiatives such as shared fridges, anti-waste restaurants/kitchens, and physical social grocery stores which are all part of what is known as "shared economy".

Mr. Wu presented a graph of the food donations of Carrefour Taiwan in 2017. In January only 12 stores were involved in food donations, by July 78 stores have already joined, and all of the 100 Carrefour stores in Taiwan are expected to donate food by the end of 2017. This is a gradual process which requires adequate training of staff and solid and certified partnership with food banks or other NGOs.

A "culture of donation" is the vision that Mr. Wu presented not only composed of food retailers such as Carrefour but also made of food distribution centers (wholesalers), street shops (bakery, small fruit vendors), and traditional markets.

Besides helping people in need, food that otherwise may have become waste can be used in social enterprise. In this context, Mr. Wu gave the example of fruits that fall to the ground before they are harvested or fruits which do not meet the standard in size or appearance to reach the market, they can be used to produce value-added (anti-waste) products such as jam, juice, fruit popsicle, among others.

Legislation could encourage food donations in 3 phases:

- Short term: Responsibility exemption of food donation
- Mid-term: Tax incentives to food donors
- Long term: Obligation of food donation

Figure 1 shows the Model that Carrefour-Taiwan has developed to reduce food waste at the retail level.



#### 2.4 "Think Eat Save" and UNEP's Regional Food Waste Prevention Program Ms. Clementine O'Connor (Think Eat Save Program Coordinator)

Ms. Clementine introduced her background in the field of food loss and waste which dates back to 2009, and since then she has been involved in various European and global initiatives that explore FLW as a challenge for food security, the environment, economy and society in general.

According to the UN, FLW accounts for one third or 1.3 billion tons of food. In addition, if FLW was a country, it would be the third-largest GHG emitter only after China and the USA. The cost (based on 2009 producer prices) of wastage is around 750 billion USD.

Sustainable Development Goal (SDG) Target 12.3 "By 2030, halve per capita global food waste at the retail and consumer levels and reduce food losses along production and supply chains, including post-harvest losses" is a call to action for economies and companies around the world.

Ms. Clementine mentioned that there are 3 steps to deliver SDG 12.3:

- 1. Adopt a target consistent with SDG Target 12.3
- 2. Measure and publicly report of FLW
- 3. Take action: adopt policies, incentives, investment and practices that reduce FLW.

In terms of target adoption, national and regional governments have adopted targets in parts of Europe, Africa, Australia and North America; however, for much of the APEC region and Latin America there is not a specific target adopted to reduce FLW. The 400 largest consumer good companies in the world, represented through the Consumer Goods Forum, have also committed to cut food waste in half which is in line with SDG 12.3

Measurement and reporting is encouraged to private and public institutions. This could be supported from the Food Loss and Waste Protocol which provides a global standard for FLW measurement. The U.K. is the first country to quantify FLW at the national level across the supply chain. Their calculation points out that more than 10 million tons of food are wasted per year. Governments around the world are moving toward measurement of FLW; for example, the Ministry of Environment of Thailand will host a workshop on FLW measurement to help set the national baseline.

The third step for delivering SDG 12.3 is to take action. Governments, companies and civil society should accelerate and scale up adoption of policies, incentives, investment and practices that reduce FLW.

Ms. Clementine introduced briefly the UNEP (United Nation Environmental Programme) Think-Eat-Save campaign as a capacity building programme for food waste prevention at national and regional levels. In 2014, a guidance for public authorities, businesses and other organizations on mapping, planning, and delivering effective food waste prevention strategy was published.

The guidance methodology consists of 4 modules:

- 1. Mapping and measuring food and drink waste
- 2. Options for developing national or regional policies and measures
- 3. Developing and implementing programmes to prevent and reduce household food and drink waste
- 4. Preventing food waste in business supply chains (retail, manufacturing & food service)

Ms. Clementine ended up her presentation by giving the following recommendations to APEC economies:

- Encourage or facilitate voluntary agreements between government agencies and companies
- Promote adoption of public policies aimed at reducing FLW (e.g. simplifying date labeling, incentivizing food donation, requiring data reporting)
- Support new funding mechanisms for investment in FLW reduction, and enable comprehensive awareness-raising campaigns.

#### Session 3: Review of APEC Projects on Reducing Food Losses and Waste

3.1

# The Major Outcomes of Our APEC project: "Enhancing Connectivity of APEC Grain Standards & Small Farmer and SMEs' Food Loss-Reduction Technology and Experience"

Dr. Sun Hui (Grain Science Academy, State Administration of Grain, PRC)

In 2016, the Research report on Connectivity of APEC Grain Standards collected grain standards of 10 economies and international grain standards, analysis and recommendations were based on these standards.

In August of 2016, the seminar on "Enhancing Connectivity of APEC Grain Standards & Small Farmer and SMEs' Food Loss-Reduction Technology and Experience" received more than 90 participants and served as a platform for sharing information about the standardization on cereals and pulses (ISO-standard), post-harvest handling and storage of grains, and loss reduction.

The research report of this project analyzes and compares the technical differences in the provisions of wheat, rice, corn, and soybean standards of APEC economies.

There are differences among APEC economies grain standards, particularly definitions, classification parameters, grading factors and test methods. These differences may cause misunderstandings, inefficiency and additional costs to the international trade of grains.

The Chinese government has conducted activities to reduce food loss and waste. In the post-harvest handling, new technologies for small farmers and SMEs are being promoted. On the food consumption side, publicity to the masses to save food are being conducted.

Grain storage for small producers and according to climate conditions is being promoted. In the food processing, stakeholders share best practices in FLW reduction and try to set a circular economy mode, and also the reduction of milling degree of rice.

Dr. Hui presented how the vitamin B1 and Iron content of rice decreases with overmilling of the grain. Over milling causes at least 5% waste of grain and reduces by 10-20% the nutritional content, while also increases 25% of energy usage and related cost of processing.

Dr. Hui remarked that PPFS should establish a group of experts to share best practices of grain standards, harmonize definitions and test methods, review outcome and impacts of interventions.

As a next step the initial technical work of the group of experts in grain standards should include:

• Compare test methods of factors such as weight, foreign material, moisture and protein content.

- Strengthen connection and cooperation between PPFS and related APEC standard committees such as CTI and SCSC.
- Enhance experience sharing on FLW reduction and popularize technology for small farmers and SMEs.

In conclusion, the connectivity of grain standards can facilitate grain trade, support industrial development, promote technical progress, and play a significant role in the food security of the Asia-Pacific region.

#### 3.2

#### Summary Report of "High Level Public-Private Forum on Cold Chain to Strengthen Agriculture & Food's Global Value Chain" *Ms. Miki Okumura* (*Ministry of Agriculture, Forestry and Fisheries, Japan*)

The Forum was held on October 28 and 29, 2015 in Kagoshima Prefecture in Japan. A total of 75 participants from 13 APEC economies attended the meeting.

The Forum's objectives were:

- Understand the current situation and benefits of cold chain systems
- Share experiences and knowledge regarding cold chain system
- Develop a network among stakeholders.

Some of the topics covered in the agenda of the forum are: challenges on development of cold chains, public-private partnerships opportunities, and also a field trip to observe the facilities. In addition, presentations about global food value chains and cold chains in agriculture and agribusiness were conducted. Similarly, comprehensive introduction to the cold chain development and situation in Japan were provided.

Participants expressed their view on public finance and support for the introduction of cold chains. Also, they discussed the importance of soft components such as human resource development to maintain the cold chain. In addition, an exhibition of cold chain technology was also provided. Private and public organizations introduced the latest technologies for the entire food value chain from production to final consumption.

The proposal for a creation of an APEC Online Cold Chain Forum with the support of the Global Cold Chain Alliance was raised by Japan. Members of the online Forum are those interest in cold chains from Government, Private, and Academia. They can discuss issues regarding cold chains, including policy, technology, and new products. The access to this website is for free; however, you have to create an account and provide your name, address and organization's name and address. Then you will receive a user name and password. The website is found on the following Link: <a href="http://community.gcca.org/communities/community-">http://community.gcca.org/communities/community-</a>

home?CommunityKey=e6186548-a57b-4633-b1d0-ae85f0c75eed

Infrastructure development of food markets and supply chains including the use of public-private partnerships is a way to reduce postharvest losses in APEC economies.

#### 3.3

Summary Report of "Innovative Technologies for Reducing Postharvest Losses" of US-ATTARI.

This report reviews technologies for reducing postharvest losses that are being tested or implemented globally and can be adapted and scaled up by APEC members.

The losses discussed in this report may fall into one or more of the following categories:

- Total loss, typically caused by the harmful effect of pathogens, pests, or rodents
- Reduced value
- Loss of weight
- Loss of quality
- Loss of nutritional value

There are certain critical points along the food value chain in which technologies may be used to reduce postharvest losses. In this report, the technologies are grouped into the following 7 groups of action:

- 1. Improving On-Farm Procedures
- 2. Controlling Temperature
- 3. Controlling Water Content
- 4. Controlling Quality
- 5. Improving Packing and Packaging
- 6. Improving Storage
- 7. Improving Transportation

1. Improving On-Farm Procedures

- Extend the postharvest life of green and leafy vegetables.
- Proper maturity assessment.
- Reduced stress and gentle handling of animals improves meat quality.
- Proper manicure, cotton gloves, and sharp tools.
- 2. Controlling temperature
  - Refrigeration, ice, wind-powered turbines, water sprinkling or misting, and others.
  - *The CoolBot (Case Study):* It is a device that can be easily installed to operate window air conditioner units and transform it into a walk-in cooler.
- 3. Controlling Water Content
  - Loss of water affects texture, and accelerates loss of vitamins and other nutrients.
  - Biodegradable plastics reduces water loss.
  - Reducing water content and keeping it low is critical for dry food products.
  - Zeolite Drying Bead (Case Study): Zeolites are aluminum silicate minerals. Rhino Research, a company based in Thailand, developed the FlexiDry® system. It can be used as a fast and mobile way of drying seeds.

#### 4. Controlling Quality

- Determination of standards and price of food products.
- Sorting and grading of food.
- *The catalytic ethylene generator (Case Study):* It uses ethanol dehydration to generate ethylene. This is a simple technology which is used in small ripening rooms in developed economies.

- 5. Improving packing and packaging
  - Packaging perishables.
  - Ease of cleaning and reuse.
  - Automated packing equipment
  - Manual packing.
  - Robotic technologies.

6. Improving storage

- Controlling temperature and humidity.
- Thermal insulation
- Efficient use of storage space
- Controlled and modified atmosphere regulates carbon dioxide and oxygen.
- Regular sanitation of storage facilities helps to prevent foodborne illnesses. 7. Improving transportation

#### AATARI- APEC Postharvest Loss Survey

A survey on a range of issues related to postharvest handling of fruits, vegetables, marine and freshwater fish, and dairy and meat products was circulated to APEC economies via the APEC Policy partnership on Food Security in 2015.

The questions deal with issues related to the agricultural supply and value chains, focused on the 7 points of action/intervention to reduce postharvest losses.

The goal of the survey was to enhance experience sharing of the use of new technologies among APEC economies, thus promoting the adoption of such technologies at critical points along the agricultural supply and value chains.

Representation in the survey was disappointing (responses from only 11 economies), and the quality of the responses was also less than desired. It seems probable that wider distribution would be needed to obtain the sort of information that the survey was intended to elicit. Responses for food systems (meat, fish) were provided by only one or two respondents, and there were no responses in relation to the dairy industry.

Vegetables (7) and fruits (5) received the largest feedback from economies. When the economies were asked about statistics for postharvest losses 4 for vegetables and 3 for fruits had an estimate value of the losses which varies from 10 to 40% for different economies. Producers and marketers for foreign markets have adequate technology to maintain freshness of fruits/vegetables and their quality. On the other hand, producers for local markets often lack adequate cooling equipment, packaging and grading systems, and cushioning during transport, all of which leading to higher postharvest losses.

AATARI General Recommendations to APEC economies.

- Implement methods of quantifying losses in the marketing chain.
- Institute an APEC framework of grades and standards for food products.
- Make improving cool chain infrastructure a major priority.

- Encourage local manufacture of structural insulated panels.
- Test and develop low-cost drying options.
- Encourage the use of standardized reusable plastic crates.
- Foster the development of marketing cooperatives and other organizations with the means to acquire transport vehicles and make them available to members.

#### 3.4

# **Progress Report of "APEC Services Competitiveness Roadmap" of APEC Policy Support Unit (PSU)**

Services play a vital role in the APEC region growth. Women and small business can participate in trade as services become global. In face of the need for guidance for the service sector, APEC leaders called for the strategic and long-term Services Competitiveness Roadmap (ASCR) with actions and mutually agreed targets to be achieved by 2025.

The objectives of ASCR are:

- Increase service value-adding capacity of APEC economies
- Cultivate globally competitive service sectors in APEC economies
- Expansion of trade and investment in services in APEC economies
- Wider access to more efficient and greater variety of services for APEC and its people
- Job creation and growth while promoting social inclusion and human development
- Addition of measures in pursuit of the APEC Leader's Growth Strategy for inclusive, innovative, balanced, secure, and sustainable growth.

There are 14 APEC-wide actions in which action #14 is directly related to Food Security and FLW reduction:

Action: Progressive facilitation of services to improve the regional food system to ensure access to safe, high quality food supplies across the Asia-Pacific.

**Background:** Enhancing the efficiency, productivity and safety of the food chain is central to the purpose of the APEC Food Security Roadmap Towards 2020.

The improved food security outcome owes to the role of supporting services in the agrifood sector. The PPFS and CTI's collaboration should focus also on the discussion and definition of food-related services, collection and analysis of regulatory regimes in member economies.

One indicator has been proposed for the action #14. Namely the FAO prevalence of food inadequacy (as a measure of improved food security outcomes).

Chinese Taipei through the multi-year project suggested the establishment of a coherent accounting system and indicators of food loss and waste reduction along the food supply chain to enhance food security and environmental sustainability for APEC member economies.

Enhancing the Global Value Chain is a mutual goal of both ACSR Implementation Plan and the APEC Action Plan for Reducing Food Loss and Waste.

In conclusion, for FLW reduction, services competitiveness can be enhanced by improving the value chain such as quantifying losses in the marketing chain, improving cool chain infrastructure, using innovative technology in marketing channel which is also recommended to reduce FLW in APEC economies. The need of waste estimates and proposed accounting system as a part of the PPFS outputs and indicators under ASCR.

#### Session 4: Panel Discussion on "How to Raise Awareness and Move Forward to SDG 12.3: Key Messages for Policy Making and Action Plan" Panelists:

- Dr. Tony Shih-Hsun Hsu (National Taiwan University, Chinese Taipei)
- Dr. Amelita Rodriguez Salvador (PhilMech, the Philippines)
- Dr. Nguyen Do Anh Tuan (IPSARD, Viet Nam)
- Dr. Ngo Thi Thanh Truc (Can Tho University, Viet Nam)
- Dr. Bao-Ji Chen (National Taiwan University, Chinese Taipei)
- Dr. Miranda Mirosa (University of Otago, New Zealand)

#### Dr. Tony Hsu

Vision and Goal of the "APEC Food Security Roadmap towards 2020":

• APEC economies will strive to reduce FLW by 10% by 2020, and advanced beyond the Millennium Development Goals (Paragraph #7).

It is an average level for all economies. A Specific indicator for each economy.

Goal setting:

- A non-bidding FLW reduction target for APEC economies.
- In 2011 the FLW in APEC according to FAO is 674 MT, therefore, 10% reduction is 67.4 tonnes by 2020.

Summary from June Expert Consultation. A 10% reduction of FLW in APEC may:

- Divert 71 million tons from landfills
- Create 81 thousand new jobs
- Food donations of 9.8 billion meals
- 8.7 trillion of gallons of water use reduced
- However, this will have a financial cost of about 9 billion dollar per year

SDG 12.3 is vision to the future, but also a challenge that can be followed by APEC economies.

Triple perspective (HLPE 2014)

- A systemic perspective
- A sustainability perspective
- A food security perspective (Focus on food for human consumption)

Definitions of Food Loss and Waste:

- The decrease in quantity and quality of food for human consumption along the entire food supply chain, FAO.
- Food loss of edible food products (ERS)
- EU Fusions, includes non-edible parts
- US EPA: amount of food going to landfills from industrial, houses, commercial establishments.

A food-use-not-waste Hierarchy to Minimize FLW. Specific indicators for each economy situation The FAO and ERS only apply to edible parts, but they do not specify the term "edible"

Should the issue of edibility be ignored for APEC FLW reduction?

Different indicator but same definition may work as well for APEC economies Such as type 1, 2 and 3 of measurement.

There is not ranking, this is for self-reporting.

Specific indicator can be developed based on each economy situation.

#### Dr. Amelita Rodriguez

Setting a mindset among stakeholders, from producers all the way to consumers. For example, in the Philippines, up to the milling process of rice the loss is in the range 10 - 20 percent. Although this is a preliminary indicator, it demonstrates that there is a need to take action, the challenge is how can we make farmers or the responsible stakeholders to assume the target to reduce losses?

Once that they have a mindset that this food loss is real, again, they can start thinking how to reduce the losses. For example, the loss figure of rice is 2.5 % at harvesting stage is a measure from the Philippines, one of the way to reduce the losses is the introduction of combined harvesters, which is a shift in the practices from manual to mechanical harvest.

We have to explain the benefits of these changes. Other reason to adapt mechanization may be the fact of labor shortage, therefore, through mechanization the cost of production may be decreased. We may begin from a small base of farmers and enlarge the number of people involved in the reduction of postharvest losses.

The FLW from harvest to distribution in developing economies is around 62% and in the consumer side the loss is around 18%. Food recycling at home is important too, being creative and saving resources can create a huge impact for our economies.

#### Dr. Nguyen Do Anh Tuan

We have to talk about policy, how to change behaviour, and consumer awareness.

In Vietnam, the government and private sector are well aware of the importance to reduce FLW, but not among the general public. The loss in the rice value chain is about also looking at the opportunity cost of losses, such as reuse of land for other purposes, in case there is an increase in the supply of rice. In terms of environmental value, it is about reducing carbon emissions. Then, there is the question how to measure.

In Vietnam, there is not a reliable measurement of the loss. Although there is precise measurements of the output of different crops, there is little to no data of the loss along the value chain. Countries need flexibility to set the measurements, such as the edible an inedible definition.

In terms of policies in Vietnam, because of the fragmented land we would like the private sector to link more closely producers to consumers. There are four important things for this to happen:

- 1. How to link the companies to work with farmers or the fragmented land such as to apply similar levels of technology.
- 2. Financing, how to get better financing schemes.
- 3. PPPs are critical too.
- 4. Improve the infrastructure and logistics for agricultural value chain. Rural-Urban connectivity is very important, and in the near future there will be a report about this.

#### Dr. Ngo Thi Thanh Truc

About paddy production in the Mekong Delta:

- 25 million tons of paddy per year
- 12-15% of rice exports from Vietnam is produced in the Mekong Delta
- 60 100% open burnt rice straw. One ton of paddy to one ton of straw.

Pig raising in Mekong Delta:

• Nearly 4 million, small scale, no waste treatment system.

Pangacius production 211000 tons as of march 2017.

• 1 kg raw fish = 0.098 COD

Opportunities to reduce food loss and waste in rice, pig, and fish production in the Mekong Delta through:

- Alternative use of land such as mushroom production,
- Biogas production can be used to manage pig manure.
- Rice husk to make briket.
- ASC certification for fish.

Challenges for policy recommendations/ technology adoption in the Mekong Delta:

- Very small scale of production, and low income
- Lack of available technologies, economically feasible and socially acceptable
- Lack of financial support
- Lack of regulations and enforcement

#### Professor Bao Ji Chen

From the governmental side for example, Rice standards in China and Japan can help to make farmers reduce the food losses in the value chain.

Partnerships: Well developed and less developed economies have different stories around FLW, but the PPPs can be established within all APEC economies.

Some suggestion for the project of FLW reduction:

- Increase food safety and security, the reason for that is dealing with the climate change. Because under the extreme climate change situation, by the year 2050, with a population increase, there won't be enough land and resources to feed all people, on top of that is the changing climate which affects productivity. If we are doing something to reduce FLW by 10%, probably it is equal to increase our production by 10%, which is very difficult, but by this FLW reduction we are increasing our food security.
- I would like to encourage some economies or private sector to pick up some items and measure the losses in those sectors. Use the definition at your own choice and see how much the losses affect.

#### Dr. Miranda Mirosa

10 points to address FLW reduction in the APEC economies:

- 1. The time is now because FLW is receiving unprecedented attention from the media, NGOs, general public and private and governmental organizations.
- 2. There are tools with interdisciplinary approaches.
- 3. Sharing information among APEC member is important
- 4. The idea of an APEC Center for FLW is a way to move forward further collaboration.
- 5. Targets: should we adapt or adopt the SDG 12.3?
- 6. Measurements: it is important to measure everything edible and inedible items.
- 7. Acting, campaign materials and consumer awareness.
- 8. National, local council, multi stake holder platforms to share best practices and experiences.
- 9. Network of people who are interested in this topic of FLW has already been established by this multi-year project, it is now time to act and lead by example, showing our successes.
- 10. Changing norms about what is acceptable and not to eat, a challenge to the customary acceptable norms.

#### Wrap-up Session Dr. Ching-Cheng Chang

This workshop was divided into 4 panel sessions and directed by 14 speakers.

- Session 1: Practical guideline to measure, and some recommendations to reduce FLW.
- Session 2: Experience sharing from the private sector.
- Session 3: Review of APEC projects on reducing FLW.
- Session 4: Panel discussion, and how we can move forward.

Key Message from Session 1

- Multiple challenges from climate change, population growth, and rapid urbanization, the reduction of FLW can contribute to food security and sustainable food system.
- We need a common understanding, a concrete target, and concrete actions.

Key Message from Session 2

- Carrier, Nestle, Carrefour all shared their experiences to reduce FLW.
- We need to encourage voluntary agreements between government and companies, promote adoption of policies and support funding initiatives.

Key Message from Session 3

- Opportunities to reduce FLW can raise from:
  - Enhance connectivity
  - Investment in cold chain
  - o Support adoption of new technologies
  - Addressing the importance of the service sector

Key Messages from Session 4

- Bring policy priorities
- Build partnerships
- Seek incentive to mobilize all stakeholders
- Work Together on:
  - o Measurement
  - o PPPs
  - Awareness campaign and education
  - Challenge boundaries (definition, by-product development)

Next Steps of the Multi-Year Project

- Hold an APEC High Level Policy Dialogue on reducing FLW. A Public Awareness Campaign in Chinese Taipei.
- Complete a final report with policy recommendations and practical guidelines for measurement, self-evaluation, reporting and pilot actions based on each economy situation.
- Disseminate project results via APEC-FLOWS online website.