



**Asia-Pacific
Economic Cooperation**

2015/EWG50/ERTF/003

**Developing Solar-Powered Emergency Shelter
Solutions As an Energy-Resilience Tool for Natural
Disaster Relief in APEC Community (EWG 22/2015A)**

Purpose: Information
Submitted by: China



APEC
PHILIPPINES
2 0 1 5

**First Energy Resilience Task Force Meeting
Hawaii, United States
17 December 2015**

APEC Project Proposal

Project title and number:	EWG 22 2015A – Developing Solar-Powered Emergency Shelter Solutions (SPESS) as an Energy-Resilience Tool for Natural Disaster Relief in APEC Community		
Source of funds (Select one):	<input type="checkbox"/> General Project Account <input type="checkbox"/> TILF Special Account <input checked="" type="checkbox"/> APEC Support Fund		
APEC forum:	Energy Working Group (EWG), specifically its sub-forum of Expert Group on New and Renewable Energy Technologies (EGNRET)		
Proposing APEC economy:	P. R. China		
Co-sponsoring economies:	Chinese Taipei; Hong Kong, China; The Philippines; The United States		
Expected start date:	15 Nov 2015		
Expected completion date:	31 Dec 2016		
Project summary: Describe the project in under 150 words. Your summary should include the project topic, goals, planned activities, timing and location: <i>(Summary must be no longer than the box provided. Cover sheet must fit on one page)</i>	Accounting for 70 percent of all natural disasters, the Asia Pacific is highly prone to climate change impact. One of APEC 2015's priority areas is " <i>Building Sustainable and Resilient Communities</i> ", and this project aims to foster cooperative efforts to strengthen APEC community's energy-resilience and sustainability affected by natural disasters. Conventional grid-based energy supply often experiences severe disruptions after disasters hit. Developing Solar-Powered Emergency Shelter Solutions (SPESS) contributes to building an energy-resilient APEC community through secure and sustainable energy supply along with emergency sheltering for disaster victims in dire needs during disaster relief period. This project will establish two workshops to engage key APEC stakeholders/experts and an open/crowdsourcing innovation competition to tap into APEC community's knowledge base for a more diverse perspective, culminating in the development of " <i>Recommendations on Deploying SPESS for Energy-Resilience in Disaster-Stricken APEC Community</i> ". The <i>Recommendations</i> will represent a humble step towards building sustainable and resilient APEC communities.		
Summary of Proposed Budget (USD) :	APEC funding	Self-funding	Total
	149,350	4,500	153,850

Project Overseer Information and Declaration:

Name: Xu Zhao

Title: Researcher

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As Project Overseer and on behalf of the above said Organization, I declare that this submission was prepared in accordance with the **Guidebook on APEC Projects** and any ensuing project will comply with said Guidebook. Failure to do so may result in the BMC denying or revoking funding and/or project approval. I understand that any funds approved are granted on the basis of the information in the document's budget table, in the case of any inconsistencies within the document.

Xu Zhao / **12 Oct 2015** Name of Project Overseer / Date

Project Details

SECTION A: Relevance to APEC

[Answers to questions 1–3 may be taken or adapted from the Concept Note]

1. **Relevance:** What problem or opportunity will the project address and why is it important? How will the project benefit APEC members and the region? Which Rank on this year's APEC Funding Criteria does this project fall under? Briefly explain why. Is it also linked to other Ranks? If so, which topics and how? [$\frac{1}{2}$ page]

This project endeavors to foster cooperative efforts in developing Solar-Powered Emergency Shelter Solutions (SPESS) to strengthen the wider APEC community's energy-resilience & sustainability affected by natural disasters, thereby contributing to APEC 2015's priority area of "*Building Sustainable and Resilient Communities*"^[1].

The Asia Pacific region experiences over 70 percent of the world's natural disasters with just 52 percent of the earth's surface area and 40 percent of the world's population. APEC economies collectively account for half of global trade, 60 percent of total GDP and much of the world's growth. Significantly, they also incurred over USD 100 billion annually in disaster-related losses during the last decade^[2]. Catastrophes in the region - such as the 2005 Hurricane Katrina and the 2012 Superstorm Sandy in US, the May 2008 earthquake in China's Sichuan province, the 2010–11 Queensland floods in Australia, the Great East Japan Earthquake and the ensuing tsunami on 11 March 2011, and the Super Typhoon "Haiyan" hitting eastern Philippines on 8 Nov 2013 - are important reminders of the severe situation APEC community faces. Disturbingly, it is warned that the decades ahead will witness increased intensity and frequency of disasters in the Asia Pacific region, exacerbated by climate change and human elements such as unplanned urbanization and poor land-use management.

When natural disasters hit and conventional grid-based energy supply is severely disrupted, the to-be-developed (stand-alone/modular/foldable) SPESS is capable of being quickly deployed on-site, providing displaced victims with the much-needed emergency shelters as well as a reasonable amount of energy from integrated solar energy systems (e.g. PV is integrated into the shelter's roof). From this perspective, SPESS also offers a new arena for low-carbon renewable measures (like solar) to be integrated into an overall (power-grid for normal time & SPESS for disaster-relief time) energy-resilient and sustainable power infrastructure. For a post-disaster community facing relatively long-term recovery, interconnected SPESS could even form micro-grids to sustain community rehabilitation.

SPESS project falls under Rank 1 on 2015 APEC Funding Criteria^[3], as it evidently relates to *Building Sustainable and Resilient Communities*, *Emergency Preparedness and Disaster Management*, and also *Trade & Investment Facilitation and Liberalization* (SPESS can promptly provide much-needed sheltering and energy for disaster-affected residents, thereby contributing to facilitating local community "back in business" earlier and liberalizing local economy's Trade & Investment activities from the hindrance of natural disasters).

SPESS project also supports *APEC Leaders' Growth Strategy* (i.e. Rank 2), as it relates to *Sustainable Growth* (energy security and energy resiliency including the development of low carbon technology and alternative energy sources), *Secure Growth* (human security), and *Innovative Growth* (science and technology approaches in disaster preparedness, risk reduction, response and post-disaster recovery).

Useful links:

[1] <http://apec2015.ph/apec-2015/>

[2] http://www.apec.org/Press/News-Releases/2015/0930_SDMOF.aspx

[3] <http://www.apec.org/Projects/Projects-Overview.aspx>

2. **Objectives:** Describe the 2-3 key objectives of the project. (e.g. to ensure workshop participants will be able to...; to create a framework...; to develop recommendations...; to build support...; to revise strategies...; to create an action plan; ...improve capacity in; etc.) [$\frac{1}{4}$ page]
 - **To promote low-carbon energy technology innovation** in APEC, through advancing the integration of solar energy and emergency shelter technologies in the development of SPESS;
 - **To improve capacity of APEC stakeholders (especially those from developing members)** in adopting science-based approaches for emergency preparedness and post-disaster response, through harnessing an innovative, low-carbon, energy-resilient technology of SPESS;

- **To develop *Recommendations on deploying SPESS*** that responds to the varying climatic, economic and cultural conditions of APEC member economies, helping bring low-carbon energy measures into the mainstream of APEC's science-based Disaster Management framework.

Open Innovation Competition

3. **Alignment: Describe specific APEC priorities, goals, strategies, work plans and statements that the project supports, and explain how the project will help achieve them. Explain how it is aligned with your forum's work plan / strategic plan.** [less than ½ page]

- Alignment with APEC:

The 2014 APEC Leaders' Declaration has stated under article 49 that it encourages *further cooperation of member economies in disaster preparedness, risk reduction, response and post-disaster recovery*, including through *the application of science and technologies*. Given the changing global climate and natural disasters' negative impacts on the Asia Pacific region, APEC 2015 Philippines has prioritized the goal of "*Building Sustainable and Resilient Communities*". This project supports the above APEC statements/priorities as it fosters APEC members' collaborative efforts in developing SPESS as an innovative energy-resilient technology for natural disaster relief, thereby contributing to building a sustainable and energy-resilient APEC community.

- Alignment with the originating forum of Energy Working Group (EWG):

This project is aligned with EWG's Strategic Plan in *Strengthening Energy Security, Promoting Energy Efficiency and Sustainable Communities*, and *Developing Cleaner Energy Source*, as SPESS aims to bring sustainable and cleaner energy technology (solar) into disaster-relief efforts among communities whose energy security has been affected by natural disasters.

4. **For TILF Special Account applications: Briefly describe how the project will contribute to APEC trade and investment liberalization and facilitation with reference to specific parts of the Osaka Action Agenda (Part 1, Section C and, where appropriate, Part 2). For APEC Support Fund applications: Briefly describe how the project will support the capacity building needs of APEC *developing economies*, and how they will be engaged.** [¼ page]

It is no surprise that developing economies are at higher risk of climate change disasters, according to Verisk Maplecroft's Natural Hazards Risk Atlas⁴. High economic exposure to natural hazards in emerging developing economies are compounded by a lack of resilience factors including economic strength, strong governance, established infrastructures, disaster preparedness, tight building regulations etc., which are much more likely effective and in place in developed economies. Hence, there is a high demand from developing economies for disaster preparedness related projects like SPESS.

SPESS project will be specifically tailored to the capacity building needs of APEC's developing economies, featuring strong developing economy involvement in the planning and executing of the project. In the early planning phase, disaster management staff (especially those responsible for emergency sheltering and its energy supply) from APEC developing economy governments will be invited to workshops to better understand their current difficulties, needs and their expectations for SPESS. They will also be joining in a technical exhibit to be updated on state-of-the-art solar energy technology and emergency shelter solutions. In the executing phase, the development of SPESS will pay special attention to the climatic, economic and cultural conditions in developing members, whose comments and feedback on the developed SPESS will be taken as valuable input for further improvement.

Useful links:

[4] http://maplecroft.com/about/news/nha_2012.html

SECTION B: Project Impact

5. **Outputs: Describe products or services that the project will create. This may include workshop, reports, tools, research papers, recommendations, best practices, action plans etc.** [½ to ¾ page]

The SPESS project delivers the following outputs:

- **Literature survey** on the current practice of emergency sheltering and its energy supply in APEC as well as available technologies/solutions in this field (NB The survey results would form part of the final project report);
- **Workshop A** (alongside EWG51 in Mar/Apr 2016) where delegates describe their current practice in emergency sheltering and its energy supply, present their expectations on the to-be-developed SPESS, agree on an action plan of the SPESS project and improve their knowledge in solar energy technology & emergency shelter solutions;
- **APEC SPESS Open Innovation Competition website** collecting, depositing and showcasing innovative SPESS designs from APEC citizens;
- **Workshop B** (in Sep/Oct 2016) where APEC stakeholders/experts review the proposed SPESS designs and agree on an outline of the final project report;
- **Final project report** of *Recommendations on Deploying SPESS for Energy-Resilience in Disaster-Stricken APEC Community*.

6. **Outcomes:** Describe the specific changes the outputs are expected to achieve in the medium-term. What changes in policy, processes or behavior will the project lead to? [$\frac{1}{2}$ to $\frac{3}{4}$ page]

- The awareness and knowledge of APEC's relevant stakeholders on SPESS is expected to be significantly improved, which helps bringing low-carbon energy technologies into the mainstream of APEC's science-based Disaster Management framework;
- Developing SPESS contributes to the growth of APEC's solar (e.g. PV) & shelter (e.g. modular/prefabricated house) industry, improving members' innovation capability in low-carbon energy technologies;
- The project also has the great potential to lead to the actual deployment of SPESS as an energy resilience tool for natural disaster relief practice in APEC community over the next few years.

7. **Beneficiaries:** Who are the direct project participants and users of the outputs? Describe their qualifications, level of expertise, roles/level of responsibility, gender, economies represented, government departments, APEC fora involvement etc. Explain how they will use and benefit from the outputs. Who else will benefit from the project and how? [$\frac{1}{2}$ to $\frac{3}{4}$ page]

The direct project participants and users of the outputs are APEC's government staff responsible for managing disaster relief efforts in providing emergency sheltering and its energy supply. They could be senior-ranking decision-makers or frontline coordinators for relief implementation. They could be women or men, from developing or developed economies. They could be representing their economies at an APEC forum like APEC EPWG (Emergency Preparedness Working Group).

Citizens from APEC's solar and shelter (modular/prefabricated house) industry or R&D organizations can also benefit from SPESS project, which brings a new growth point, creates jobs in product development and manufacturing etc., and improves our members' innovation capability.

More importantly, APEC citizens in disaster-stricken communities can significantly benefit from SPESS with the provision of much-needed sheltering and energy supply (e.g. used for lighting, ventilation, etc.), which significantly reduces further disaster-induced casualty and improves the living standard of displaced/homeless disaster victims (especially vulnerable women and children).

APEC member governments evidently benefit from disaster-relief-related capacity building projects like SPESS, as beyond their immediate physical effects, large-scale natural disasters often exacerbate the risk of societal unrest and even trigger political instability.

8. **Dissemination:** Describe plans to disseminate results and/or outputs of the project, including:

- **The number, form and content of any publications. (Note: APEC will not fund publications that are only presentation slides, or website maintenance. Electronic publication encouraged.)**
- **The target audience.**
- **Any intention to sell outputs arising from this project.** [*less than $\frac{1}{2}$ page*]

Final project report will be solely published electronically at APEC & EGNRET websites. There will be no paper-based publication using APEC fund for SPESS project, echoing the APEC efforts for paperless trading. The APEC SPESS Open Innovation Competition website also allows APEC citizens from around the Pacific Rim to review the various visuals, artistic renderings, and construction documents of the submitted SPESS designs. The post-project

maintenance of the APEC SPESS Open Innovation Competition website shall be the responsibility of PO's home institution, i.e. APSEC.

The target audience would be stakeholders working on emergency shelters and their energy supply from sectors of governments, businesses and academia etc. as well as the common people of the APEC community who may be interested in learning more of disaster preparedness.

The SPESS Open Innovation Competition would be actively promoted within relevant green design/innovation community online, e.g. through architecture design competition listing sites of Bustler^[5], Inhabitat^[6] etc. The Open Innovation will also advertised through circulation among EWG & EPWG emailing lists to reach potential designers/experts.

There is no intention to sell outputs arising from this project.

Useful links:

[5] <http://www.bustler.net/index.php/competitions/>

[6] <http://inhabitat.com/designcompetitions/>

9. **Gender: What steps will the project take to ensure the participation and engagement of both men and women in project activities? How do project objectives benefit women?** *[less than ½ page]*

The SPESS project will take steps to ensure the engagement of women in project activities. For workshop participants and speakers, the PO will strive to ensure that women account for more than 40% of the total. The PO will also actively promote the involvement of women in the APEC SPESS Open Innovation Competition, e.g. by advocating for a minimum percentage (30%) of women designers/engineers in each team competing for the Open Innovation Competition.

The above measures aims to contribute to the growth and development of women in the workforce of disaster-management government sectors as well as solar energy and emergency shelter industry sectors.

A gender approach is to be promoted in SPESS Open Innovation. As indicated in the following Red Cross Document ^[7], men and women have differing needs and access to temporary housing. Women needs will be built directly into the SPESS design competition, and play a major role in the final design selection.

Useful Links:

[7] http://www.redcross.org.au/files/2011Gender_and_Shelter.pdf

SECTION C: Project Effectiveness

10. **Work plan: Provide a timeline of actions you will take to reach your objectives. For each, include:**

- **How it will be implemented; how member economies, beneficiaries & others will be involved**
- **Related outputs for that particular step (e.g. contract, agenda, participant list, workshop, report)** *[1-2 pages. Answers may be taken or adapted from the Concept Note]*

Timeline	Key Activities	Deliverables
15 Nov 2015- Mar/Apr 2016	<p>Start-Up Phase</p> <p>1) Literature survey on the current practice of emergency sheltering and its energy supply in APEC as well as available technologies/solutions in this field;</p> <p>2) Identification of and liaison with key stakeholders (e.g. economies' officials/agencies responsible for disaster relief</p>	<p>1) Report of literature survey results;</p> <p>2) Up-to-date list of APEC's stakeholders & experts in government, R&D and industry sectors throughout the whole supply chain of emergency shelters and their energy supply;</p> <p>3) The draft online package of APEC SPESS Open Innovation Competition for stakeholder's endorsement at Workshop A.</p>

	housing & energy-supply, researchers and manufacturers closely engaged in SPESS-related activities); 3) Website construction and rules/action-plans development for APEC SPESS Open Innovation Competition.	
Mar/Apr 2016 (as a side event near EWG51)	Workshop A	Delegates shall present their current practice in emergency sheltering and its energy supply, present their expectations on the to-be-developed SPESS, agree on an action plan of the APEC SPESS Open Innovation Competition and improve their knowledge on solar energy technology & emergency shelter solutions through interaction with SPESS experts.
Mar/Apr-Sep/Oct 2016	Development of SPESS (including schematic designs & construction documents)	Two in-parallel work streams of SPESS development: 1) SPESS development undertaken or led by key APEC stakeholders/experts who attend workshops of the project; 2) Crowdsourcing/open innovation on SPESS by common people from APEC communities, who are interested in presenting their ideas.
Sep/Oct 2016 (i.e. EWG51)	Workshop B	APEC stakeholders/experts review the proposed SPESS designs from the above two parallel work streams, and agree on the content outline of the draft final project report.
Sep/Oct - Dec 2016	Project Finalization Phase	Finalization of <i>Recommendations</i> based upon outcomes of previous survey, workshops and open innovation; Publication & Promotion of <i>Recommendations on Deploying SPESS for Energy-Resilience in Disaster-Stricken APEC Community</i> .

11. **Risks: What risks could impact project implementation and how will they be managed?**

[$\frac{1}{8}$ to 1 page, depending on project nature/complexity]

If the SPESS development is a mono-track work stream, i.e. SPESS being developed solely through the workshop-attending APEC stakeholders/experts or their contacts/referrals, this may result in risks of uncertainty or inadequacy in terms of design scheme quantity and quality. Hence, the presented dual-track work streams of SPESS development are adopted, with SPESS Open/Crowdsourcing Innovation Competition as the second track work stream.

The to-be-developed SPESS Recommendations will take into account public health & safety while meeting the standards of member economies. This could be done through input from the literature survey, consultation with the member economy representatives etc. Public health and safety will be one of the key criteria for selecting SPESS designs and construction documents that are to be adopted by the *Recommendations*. This is to ensure that the pre-fabrication, transport, on-site deployment and operation of SPESS cause no hazards to the environment and the users' health & safety.

12. **Monitoring and Evaluation: How will you know whether the project achieved its objectives?**

- **What information will be collected to assess progress and impact (e.g. stakeholder feedback, website hits, participant stats)? How will gender impacts be measured?**
- **How will you collect it (e.g. surveys, meetings, interviews, peer review, records review)?**
- **What indicators will you use and/or measure to know if the project is on track (monitoring) and successful in meeting its objectives (evaluation)?** [$\frac{1}{2}$ page]

The target evaluation indicators include but are not limited to workshop participant stats (the numbers of total delegates, economies represented and women delegates), survey on workshop participants' feedback (through follow-up evaluation forms), and the number of the submitted SPESS designs plus the website hits.

The specific stats are minimally 22 participants representing 11 travel-eligible economies & 6 experts/speakers for workshop A & B respectively, 21 SPESS scheme proposals selected from a larger collection developed through the dual-track work streams of SPESS development. It should be noted that the intellectual property of all SPESS proposals shall belong to their rightful owners, i.e. the developers.

With respect to the specific SPESS ideas that are generated at the APEC workshops, all contributors shall own the IP based on the agreed-upon percentages of their respective contributions. In the implementation process, the PO shall take measures to ensure the project follows the APEC Website Guidelines and APEC Intellectual Policy.

In the registration for APEC SPESS Open Innovation Competition, each team will be requested to specify the percentage of women (min 30%) designers/engineers in the team. The PO and the project think-tank (please refer to Question 15) will strive to keep the project on the right track through meeting key milestones along the project timeline. Submitting APEC project monitoring report is also conducive to fulfilling the above goal.

13. **Linkages:** Describe the involvement of other APEC fora, and other relevant organizations. Include:

- **Engagement:** How are you engaging other relevant groups within and outside APEC?
- **Previous work:** How does this project build on, and avoid duplication of, previous or ongoing APEC initiatives, or those of other organizations working in this area?
- **APEC's comparative advantage:** Why is APEC the best sources of funds for this project?

[¼ to 1 page. Answers may be taken or adapted from the Concept Note]

The proposed SPESS project has a great potential to promote cross-fora collaboration (e.g. between EWG & Emergency Preparedness Working Group EPWG). Member economy representatives to EPWG would be invited to participate workshops and interact with their EWG counterparts (e.g. at Workshop A alongside EWG51). The project could also engage world-leading solar research groups (e.g. NREL of US, ITRI of Chinese Taipei, and ANU of Australia etc.), whose expertise on solar-power energy systems can contribute to an efficient, reliable and durable energy-performance of SPESS. The knowledge and experience of US DOE's world-renowned Solar Decathlon^[8] could also find its new "niche" from SPESS project.

In EPWG's meeting in Boracay in May 2015, APEC officials called for greater commitment and a science-based approach to build safe and disaster resilient communities^[9]. The present project can assist EWG in bringing an innovative, low-carbon, energy-resilient technology of SPESS into the mainstream of APEC's science-based Disaster Management framework. As mentioned at Relevance, APEC members (especially developing economies) are highly prone to the loss and damage wrought by natural disasters. As APEC is striving for "*Building Sustainable and Resilient Communities*", the proposed SPESS project would be a good investment.

Useful links:

[8] <http://www.solardecathlon.gov/>

[9] http://apec.org/Press/News-Releases/2015/0515_disaster.aspx

SECTION D: Project Sustainability

14. **Sustainability:** Describe how the project will continue to have impact after the APEC funding is finished.

- **How will beneficiaries be supported to carry forward the results and lessons from the project?**
- **After project completion, what are the possible next steps to build on its outputs and outcomes? How will you try to ensure these future actions will take place? How will next steps be tracked?**
- **How will progress on the outcomes and impacts (Question 6) be measured?** [less than 1 page]

In the post-project period, the APEC SPESS Open Innovation Competition website can continue to act as a capacity-building and resource-sharing platform, where APEC stakeholders/citizens access for information, propose and discuss on various design ideas, add more SPESS ideas, and provide more input and feedback.

The outcomes can be measured by workshop participant stats, a survey on workshop participants' feedback (e.g. whether they consider deploying SPESS in future disaster-relief efforts), and the number of the submitted SPESS designs (plus an analysis of the submission origins/demographics to evaluate the project's impact on developing economies and women), the feedback of industry R&D experts or potential manufactures on the SPESS proposals (e.g. whether they may be interested in directing their resources into further developing these SPESS).

15. **Project Overseers:** Who will manage the project? This includes managing of contractors and specialists. Please include brief details of the PO and any other main point(s) of contact responsible for this project. [less than ½ page]

The PO is Dr. Xu Zhao, a researcher working with APEC Sustainable Energy Center (APSEC) in the EWG forum. He obtained his PhD in Engineering from The University of Western Australia in 2014. Full CV is available at <http://yunpan.cn/cH4suG6THU2dQ> (Pass: 06d6).

To ensure a high quality of SPESS project, the PO would like to draw on the experience and knowledge of a project think-tank. The think-tank shall consist of resourceful economy/EG representatives from SPESS project's co-sponsors (i.e. Chinese Taipei, Hong Kong, China, The Philippines, and The United States).

SECTION E: Project Efficiency

16. **Budget:** Complete the budget and budget notes for the project in the template below. The budget should include calculation assumptions (e.g., unit costs) and self-funding contributions. Please consult the *Guidebook on APEC Projects* for eligible expenses.

APEC Project Itemized Budget

Please consult the eligible expenses in the *Guidebook on APEC Projects*

<u>All Figures in USD</u>	# of Units	Unit Rate	APEC Funding	Self-Funding	Notes
Direct Labor					
Speaker's honorarium (government officials ineligible)	12 experts	500	6,000		6 experts for Workshops A & B respectively (please refer to work plan in Question 10)
Translator's fees (strong justification is required for approval indicating that the translations are of benefit to more than one economy – please provide details/scope of work in Budget Note 1 – Direct Labor)					English shall be the official language in the project.
Short-term clerical fees (please provide details of scope of work and deliverables in Budget Note 1 - Direct Labour)	300 hrs	10		3,000	Administrative support throughout the one-year project period can be provided by PO's own team.
Contractor fees (contractors Secretary's fees to be included in cost and packaged together)	(a) 300 hrs Literature Survey (i.e. output 1 in Question 5) (b) 200hrs	25	7,500		Please refer to Question 5 for Outputs.

<u>All Figures in USD</u>	# of Units	Unit Rate	APEC Funding	Self-Funding	Notes
	Developing a light cyber-infrastructure / website to collect, deposit and showcase the media-rich SPESS designs for the online APEC Open/Crowds ource Innovation Competition on SPESS to gain diverse ideas from APEC communities	30	6,000		NB The total of APEC-funded Direct Labor is USD 19,500.
	(c) The post-project maintenance of SPESS Open Innovation website (3 years)	500 per year		1,500	
Travel (Speaker, Experts, Researchers)					
Per diem (incl. accommodation and "75% additional payment")	(a) 6 speakers x 3.75 days Workshop A in Australia (two-day)	256	5,760		(a) The two-day workshop A is to be held alongside EWG51 (NB Australia is to be the host economy of EWG51, and hence the UN per diem rate of USD256 for major cities like Canberra, Melbourne & Sydney is adopted herein).
	(b) 6 speakers x 3.75 days Workshop B at Tianjin, China (two-day)	294	6,615		(b) The two-day workshop B is to be held at Tianjin, China, possibly alongside EGNRET47.
Airfare	Totally 12 round trips	1200	14,400		As per search returns from expedia.com for the workshop dates and locations, USD1200 is the average flight expense (economy class) for attending the project's workshops.

<u>All Figures in USD</u>	# of Units	Unit Rate	APEC Funding	Self-Funding	Notes
Travel for Participants (from travel-eligible economies only. Active participants only)					
Per diem (incl. accommodations and "75% additional payment")	(a) 22 participants x 3.75 days Workshop A in Australia	256	21,120		Two participants from each of the eleven travel-eligible economies
	(b) 22 participants x 3.75 days Workshop B at Tianjin	294	24,255		
Airfare (<i>restricted economy class</i>)	Totally 42 round trips	1200	50,400		The two Chinese participants are likely to travel by high-speed train to attend Workshop B at Tianjin, and the train ticket fare can be negligible in USD (e.g. only USD 8 for Beijing-Tianjin one-way trip by train). NB The total of the above Travel-related budget is USD 122,550.
Other items					
Publication/distribution of report					Fully electronic.
Specialized equipment or materials (<i>please describe</i>)					
Photocopying	100 copies of agenda and slides for Workshops A & B	5	500		
Communications (telephone, fax, mail, courier)			800		NB An estimate here.
<i>Hosting</i> (provide breakdown, e.g., room rental, stationery)	a) 4 days of venue rental for Workshops A & B.	\$1,200 per day for the two-day Workshop A in Australia;	4,000		NB The total cost of Other Items is USD 7,300.
		\$800 per day for the	2,000		

<u>All Figures in USD</u>	# of Units	Unit Rate	APEC Funding	Self-Funding	Notes
	b) Basic stationery, non-promotional posters/banners, badges etc. for Workshops A & B (totally 4 days).	two-day workshop B at Tianjin; 500 per day			
Total:			149,350	4,500	

Budget Note 1: Direct Labor: Provide information for APEC-funded positions including general duties, total hours and who will be contracted, if known. (It is not acceptable to contract staff from your own organization or government employees.)

Please kindly refer to Contractor Fee items (a-c) in the above budget table.

The self-funded period for the post-project maintenance of SPESS Open Innovation website is first set to be 3 years herein. After the 3-year point, APSEC is pleased to continue hosting the website for extended dissemination.

Budget Note 2: Waivers: Provide details of any requests for waivers from the normal APEC financial rules, with justifications in the notes column of the budget table, or below if the waiver requires a detailed explanation.

Certain advance payments (a payment requested before a task is performed or before a cost is incurred) and instalment payments (when payments are made in recognition of the partial completion of a task or set of tasks) may be requested by contractors for labour costs of Contractor Fee item (b), i.e. costs for the design and development of APEC SPESS Open Innovation Competition website (please kindly refer to Direct Labor in the budget table).

Developing **Solar-Powered Emergency Shelter Solutions (SPESS)** as an **Energy-Resilience** Tool for Natural Disaster Relief in APEC Community

An APEC EWG(EGNRET) Project
(EWG22-2015A)

Presenter:
Dr. Xu Zhao
(PhD. Uni. of W. Aus.)
Early-Career Researcher
@ APSEC

Project No.	EWG 22 2015A
Project Title	Developing Solar-Powered Emergency Shelter Solutions (SPESS) as an Energy-Resilience Tool for Natural Disaster Relief in APEC Community
Project Status	Project in Implementation (approved in Session 2, 2015)
Fund Account	APEC Support Fund (ASF): Energy Efficiency
APEC Funding	149,350
Total Project Value	153,850
Sponsoring Forum	Energy Working Group (specifically EGNRET)
Proposed by	China
Co-Sponsoring Economies	Hong Kong, China; Philippines; Chinese Taipei; USA
Expected Completion Date	31/12/2016

Catastrophes in our region - such as

- the 2005 Hurricane Katrina & the 2012 “Sandy” in US,
 - the May 2008 earthquake in China's Sichuan province,
 - the 2010–11 Queensland floods & 2015 Cyclones in Australia,
 - the 2011 Thailand floods,
 - the Great East Japan Earthquake and the ensuing tsunami on 11 March 2011,
 - the Super Typhoon “Haiyan” hitting eastern Philippines on 8 Nov 2013,
- are important reminders of the severe situation APEC community faces.

The Asia Pacific region experiences over 70 percent of the world's natural disasters with just 52 percent of the earth's surface area and 40 percent of the world's population. APEC economies collectively account for half of global trade, 60 percent of total GDP and much of the world's growth. Significantly, they also incurred over USD 100 billion annually in disaster-related losses during the last decade^[1].

Disturbingly, it is warned that the decades ahead will witness increased intensity and frequency of disasters in the Asia Pacific region, exacerbated by climate change and human elements such as unplanned urbanization and poor land-use management.

[1] http://www.apec.org/Press/News-Releases/2015/0930_SDMOF.aspx

When natural disasters hit and conventional grid-based energy supply is severely disrupted, the to-be-developed (stand-alone/modular/foldable/flat-pack) SPESS is capable of being quickly deployed on-site, providing displaced victims with the much-needed emergency shelters as well as a reasonable amount of energy from integrated solar energy systems (e.g. PV is integrated into the shelter's roof).



<http://www.megeshelters.com/En/productview.aspx?tid=302&sid=0&id=85>



<http://dx.doi.org/10.1016/j.enbuild.2014.11.055>



<https://fortsusa.com/models/emergency/disaster-relief/>

From this perspective, SPESS also offers a new arena for low-carbon renewable measures (like solar) to be integrated into an overall (power-grid for normal time & SPESS for disaster-relief time) energy-resilient and sustainable power infrastructure. For a post-disaster community facing relatively long-term recovery, interconnected SPESS could even form micro-grids to sustain community rehabilitation.

This project endeavors to foster cooperative efforts in developing Solar-Powered Emergency Shelter Solutions (SPESS) to strengthen the wider APEC community's energy-resilience & sustainability affected by natural disasters, thereby contributing to APEC 2015's priority area of “*Building Sustainable and Resilient Communities*”^[2].

[2] <http://apec2015.ph/apec-2015/>

Dual-Chain Work Streams:

This project will establish two workshops to engage key APEC stakeholders/experts and an open/crowdsourced innovation competition to tap into APEC community's knowledge base for a more diverse perspective, culminating in the development of "Recommendations on Deploying SPESS for Energy-Resilience in Disaster-Stricken APEC Community". The Recommendations will represent a humble step towards *building sustainable and resilient APEC communities*.

SPESS project falls under Rank 1 on 2015 APEC Funding Criteria^[3], as it evidently relates to Building Sustainable and Resilient Communities, Emergency Preparedness and Disaster Management, and also *Trade & Investment Facilitation and Liberalization* (SPESS can promptly provide much-needed sheltering and energy for disaster-affected residents, thereby contributing to facilitating local community “back in business” earlier and liberalizing local economy’s Trade & Investment activities from the hindrance of natural disaster events).

[3] <http://www.apec.org/Projects/Projects-Overview.aspx>

SPASS project also supports APEC Leaders' Growth Strategy (i.e. Rank 2), as it relates to Sustainable Growth (energy security and energy resiliency including the development of low carbon technology and alternative energy sources), Secure Growth (human security), and Innovative Growth (*science and technology approaches in disaster preparedness, risk reduction, response and post-disaster recovery*).

This project is aligned with EWG's Strategic Plan in *Strengthening Energy Security, Promoting Energy Efficiency and Sustainable Communities, and Developing Cleaner Energy Source*, as SPESS aims to bring sustainable and cleaner energy technology (solar) into disaster-relief efforts among communities whose energy security has been affected by natural disasters.

Gender

The SPESS project will take steps to ensure the engagement of women in project activities. For workshop participants and speakers, the PO will strive to ensure that women account for more than 40% of the total. The PO will also actively promote the involvement of women in the APEC SPESS Open Innovation Competition, e.g. by advocating for a minimum percentage (30%) of women designers/engineers in each team competing for the Open Innovation Competition.

The above measures aim to contribute to the growth and development of women in the workforce of disaster-management government sectors as well as solar energy and emergency shelter industry sectors.

A gender-based approach is to be promoted in SPESS Open Innovation. As indicated in the following Red Cross Document [7], men and women have differing needs and access to temporary housing. Women needs will be built directly into the SPESS design competition, and play a major role in the final design selection.

[4] http://www.redcross.org.au/files/2011Gender_and_Shelter.pdf (Thanks, Pen!)

Timeline	Key Activities
Present-Apr 2016	<p>Start-Up Phase</p> <p>1) Literature survey on the current practice of emergency sheltering and its energy supply in APEC as well as available technologies/solutions in this field;</p> <p>2) Identification of and liaison with key stakeholders (e.g. economies' officials/agencies responsible for disaster relief housing & energy-supply, researchers and manufacturers closely engaged in SPESS-related activities);</p> <p>3) Website construction and rules/action-plans development for APEC SPESS Open Innovation Competition.</p>
May 2016 (as a side event near EWG51)	<p>Workshop A (“22+6”) “6”: AUS, US, CT, HK, CHN, JPN, CHN...</p> <p>Delegates shall present their current practice in emergency sheltering and its energy supply, present their expectations on the to-be-developed SPESS, agree on an action plan of the APEC SPESS Open Innovation Competition and improve their knowledge on solar energy technology & emergency shelter solutions through interaction with SPESS experts.</p>

May-Nov 2016	Development of SPESS (including schematic designs & construction documents) Two in-parallel work streams of SPESS development: 1) SPESS development undertaken or led by key APEC stakeholders/experts who attend workshops of the project; 2) Crowdsource/open innovation on SPESS by common people from APEC communities, who are interested in presenting their ideas.
Nov 2016	Workshop B (“22+6”) APEC stakeholders/experts review the proposed SPESS designs from the above two parallel work streams, and agree on the content outline of the draft final project report.
Nov-Dec 2016	Project Finalization Phase Finalization of Recommendations based upon outcomes of previous survey, workshops and open innovation; Publication & Promotion of Recommendations on Deploying SPESS for Energy-Resilience in Disaster-Stricken APEC Community.

Project Overseen by PO on behalf of APSEC.

To ensure a high quality of SPESS project, the PO would like to draw on the experience and knowledge of a project “think-tank”. The “think-tank” consists of resourceful economy/EG representatives from SPESS project’s co-sponsors (i.e. Chinese Taipei, Hong Kong, China, The Philippines, and The United States).

Linkage

APEC Cross-fora collaboration:
EWG & EPWG

Member economy representatives to EPWG would be invited to participate workshops and interact with their EWG counterparts (e.g. at Workshop A alongside EWG51).

In EPWG's meeting in Boracay in May 2015, APEC officials called for greater commitment and a science-based approach to build safe and disaster resilient communities^[5]. The present project can assist EWG in bringing an innovative, low-carbon, energy-resilient technology of SPESS into the mainstream of APEC's science-based Disaster Management framework.

[5] http://apec.org/Press/News-Releases/2015/0515_disaster.aspx

Within EWG:
ERTF & EGNRET, APSEC etc.

Between Projects:
e.g. between SPESS & PHL's *Workshop on Improving Energy Resiliency in Off-Grid Areas in APEC Member Economies (EWG09-2015A)* and APEC's other *Off-Grid/Solar* projects.

Externally:
EWG & Community Citizens of APEC
(e.g. SPESS Online Crowdsourcing Innovation)

SPESS as in APEC Project Database:

<https://aimp2.apec.org/sites/PDB/Lists/Proposals/DispForm.aspx?ID=1754>

Or simply type “SPESS” into APEC Project Database Search Engine.

Ideas for Work Program on Energy Resilience

- Priority focus on near-term work program for 2016 to present results at next EMM

Instructions from EMM12:

Disaster Proofing Energy Infrastructure

- 1. We instruct the EWG to explore the conduct of a ***vulnerability assessment on energy infrastructure*** given natural and man-made disasters in the region, in coordination with the Emergency Preparedness Working Group (EPWG) and other relevant APEC fora and international organizations. The vulnerability assessment report shall include, among others, ***regional geo-hazard maps*** identifying highly vulnerable regional spots as well as evaluation of best practices that will guide policy and program decisions on the design and location of potential supply chains, interconnections and facilities.

**Mahalo to
EGNRET, EWG & APEC Secretariat
Cosponsoring Economies
Li for the idea & go ahead**

Do feel free to share any
thoughts/ideas/suggestions on SPESS project
anytime.

The more, the merrier.
xu_zhao@tju.edu.cn

**Mahalo to
the hosts, event support staff & delegates**

Safe Trip Home

All the best in 2016

See you at EWG51

Disclaimer: All non-DIY materials used in this presentation belong to their rightful owners. I don't hold any rights.